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ANNUAL ADDRESS.

By CHIEF-JUSTICE DALY, the President of the Society.

THE GEOGRAPHICAL WORK OF THE WORLD FOR 1875.

The year 1875 completed the third quarter of the nineteenth century, a period distinguished by the activity which has prevailed in every branch of scientific inquiry, but particularly distinguished as a remarkable period of geographical exploration and discovery.

The history of geographical knowledge is a history of its rapid acquisition in periods very limited in point of time, but of great activity, and of long intervals of repose, in which comparatively little was done, or a great deal lost that had been previously acquired. For the last twenty-five years we have been living in one of those periods of exceptional activity, for at no time has an interest so widespread been manifested for geographical exploration since that great age of maritime discovery that began in the early part of the fifteenth century with the exploration of the western coast of Africa by the Portuguese, and culminated in the circumnavigation of the globe by Magellan. The comparatively small limits of about a century is all that is embraced from the time (1418) when Prince Henry of Portugal, surnamed the Navigator, took up his abode upon the promontory of Sagres to devote the residue of his life to the fitting out of expeditions for the exploration of the coast of Africa beyond Cape Bojador, a region then wholly unknown, and the year 1519, when Magellan entered the Pacific by the discovery of the straits that bear his name. Within that period the captains of Prince Henry had sailed around the continent of Africa; Columbus had discovered America; his companion, Nunez De Balboa, the Pacific; Sebastian Cabot had followed the coast of North America to the sixty-seventh parallel of north latitude; and Magellan's vessel, the Vittoria, after sailing around the world, had returned in 1522 to San

Lucar, in Spain, the port from whence she set out. The century that followed this period of discovery was occupied with the more particular exploration and settlement of the regions thus brought to the knowledge of mankind, and with the labors of geographers and cartographers in arranging the great mass of new materials into a reconstructed system of geography. With the exception of fruitless efforts to discover, in the interest of commerce, a north-east or a north-west passage to the Indies around the northern part of the globe, or directly across the pole, the zeal for geographical discovery abated through the seventeenth and eighteenth centuries; the world being sufficiently occupied with what it had already acquired, either in building up great empires in the newly-discovered continents of North and South America or by extending the rule of maritime nations over the coast of Africa, and the remoter parts of Asia, as in the settlement of the colonies established by the Portuguese and by the British conquest of India. In fact, so large a portion of the earth's surface had become known within so short a period, that it presented enough to absorb all the activity of civilized nations for three centuries in the work of colonization, settlement or conquest. It was not until near the middle of the nineteenth century, when this great work had produced its results in the establishment of such nations as the United States, Mexico, the Republics of Central America, Brazil, the other States of South America, and of a vast dominion under British rule in India, and by the extension of Russia over a large part of Northern Asia, that the attention of mankind was again drawn to the yet undiscovered or imperfectly known portions of the earth, and a new interest awakened in geographical exploration and discovery. This may be said to have begun with the founding of a geographical society in Paris in 1821, of another in Berlin, in 1828, and the establishment of the Royal Geographical Society of London in 1830. These societies were formed to cultivate the science of geography in a more comprehensive spirit, to facilitate the acquisition of geographical information by the establishment of libraries, to disseminate it by publications, and to encourage and assist scientific travelers and explorers. Like all new things, however, it was some years before these societies produced any effect, or the world recognized the value of the purpose for which they were established; whereas the results which have since been brought about, chiefly through the instrumentality of such institutions, are beyond any thing which the most sanguine of their pro-

jectors could have anticipated. The Royal Geographical Society of London may be taken as an illustration of these societies. It has now 3,035 fellows, each paying two pounds a year' a large permanent capital, and an annual income of \$35,000. It has a building of its own, a fine library and map room, and is able to, and has frequently sent out expeditions for geographical exploration and discovery, sometimes in co-operation with the government, and sometimes without it. Before, however, it reached this state it had, as I have been informed, to struggle for some years, as we have had, to keep up its organization. The turning point of its history, and in its influence, appears to have been the election, in 1843, of Sir Roderick I. Murchison to the presidency, then in the fullness of his fame as a geologist, but who thenceforth entered upon a new field, and one by which he was afterwards chiefly known. In his first annual address, an elaborate and exhaustive production, he surveyed the then state of geographical research throughout the world, and pointed out with remarkable sagacity that the parts of the globe to which exploration and research should be directed and concentrated were Central Africa, Australia, and the regions surrounding the North and South poles. Although his own fame had been made as a geologist, his course then and during the many years that he was the guiding spirit of the Royal Geographical Society, showed very plainly his conviction that a thorough knowledge of the surface of our own planet, and of those physical laws that affect everything upon it, is practically of more importance to us than a knowledge of its past physical history or of other bodies in space.

It was not that he undervalued the sciences of geology and astronomy, which, in fact, form a part of the science of geography; but the earth is our own planet, the details of which are within our grasp, and there is therefore the greater reason why every effort should be directed to acquire a thorough knowledge of it, particularly as the increase of that knowledge requires widely extended efforts over different parts of it, and a vast accumulation of details. I am not now expressing any thing he may have said, but rather deducing my own conclusions of what he thought from what he did. He was evidently impressed with the conviction that sufficient attention was not then given to the advancement of the science of geography, and to his eminently practical mind it was clear that it was not to be advanced by simply studying it in the closet, but by explorations and scientific researches, requiring persistent efforts, continuous expendi-

tures, and the labors of a numerous, zealous and intelligent class of workers over a large part of the earth's surface. To accomplish this, the whole age had to be influenced, governments enlisted, and the different societies brought into active co-operation with each other, and it was to this work that Sir Roderick then set himself, and to which he may be said to have chiefly devoted the remainder of his life.

I have selected Sir Roderick Murchison rather as a type, for it was not to him alone, but to many other eminent men in France, Germany, Russia, Italy and other countries, preëminent among whom was Alexander Von Humboldt, that the conviction became general that the unknown, or imperfectly known, parts of the earth should be thoroughly investigated, and scientific researches actively prosecuted in respect to all phenomena coming under the general head of physical geography. This has, in fact, brought about as I have said, a geographical age. There are now scattered over the globe thirty-four geographical societies, and if we add other organizations devoted in part to geographical inquiry or labors, the number would be augmented to about fifty. Many of them are well endowed, large in membership, and strengthened not only by the co-operation, but by annual grants of money from the governments of the countries in which they are situated.

How thoroughly this spirit was aroused, will appear by a brief but necessarily imperfect statement of what has been accomplished since this movement began.

When it commenced the map of Africa was, with the exception of the north-western projection above the Gulf of Guinea, and the Nile region, almost a blank from the Mediterranean, to the country in the vicinity of the Cape of Good Hope. Of the 17,000,000 of square miles in Asia, about 12,000,000 were either entirely unknown or wholly cut off from all intercourse with mankind. The condition of Australia, with an area of 3,000,000 of square miles, is best expressed by quoting the language of a geographer of that day: "A corner of this huge mass of land," he says, "is all that is known." Twenty-five years ago the European population of Australia was estimated at about 50,000; it is now over a million and a half, or thirty times as great.

The second island in point of size, and one of the most fruitful in the world — Papua, or New Guinea — is referred to by the same geographer (Murray) as almost a *terra incognita*, having generally,

he then said, "been viewed only by navigators from a distance." And in respect to the next great island — Borneo — he puts the population of the colonies there under the Dutch at about 9,000. In 1870 the population of the Dutch colonies in Borneo was 189,253. The settled portion of the United States then embraced 800,000 square miles, beyond which was an area of 2,500,000 square miles, inhabited by savages, and almost unknown, for we knew little of it then beyond what was known in the time of Jefferson, with the exception of Major Long's journey and Prof. Nicollet's exploration of the head-waters of the Mississippi.

This was the state of things at the beginning of the period referred to. I will now enumerate what has been done since, and especially within the last twenty-five years :

In Asia: The opening of the whole of China and Japan, the acquisition by the Russians of nearly the whole of Turkestan, and the inauguration of a policy on their part which, either by treaty or military conquest ; will throw open the whole of Northern Asia to the free intercourse of the world. The extensive explorations by them in Northern Siberia, and of the rivers that flow into the Arctic. The many journeys, explorations — geographical and archæological — made through Southern Arabia, Persia, Affghanistan, Beloochistan, and the northern regions of India, and explorations of the like character in Burmah, Siam and Cambodia. The settlement of the French in Cochin-China, and journeys to a partial extent in Corea, and to a greater extent in Manchooria. The Euphrates expedition. The continuation of the great survey of India. The survey of Palestine and the cutting of the Suez Canal.

In Africa: The discovery of the great lakes, as well those which are the reservoirs of the Nile as those lying south of the equator. The exploration of the country south of Abyssinia, between these lakes and the Eastern Coast, and the discovery of the great range of mountains in that region, with their snow-capped peaks, the highest elevated land in Africa. The military occupation of Abyssinia and of Ashantee by the English ; the extensive journeys and researches in Northern and North-eastern Africa, by Barth, Overweg, Richardson, Rholf, Schweinfurth, Miani, Nachtigal and others. The various expeditions and individual journeys along the Western Coast, and the explorations of its immediate interior by Du Chaillu, Burton, Baines, Blyden, Gandy, Güssfeldt, etc., etc. The two journeys across Central Africa, from east to west and west to east, by Dr. Living-

stone; his journey from the cape upward; his exploration of the Zambezi, and of the countries by which it is watered; his discovery of the great net-work of rivers and lakes in Central Africa, below the equator, which he was pursuing at the time of his death, and the following up of that exploration by Lieutenant Cameron, with the latter's journey through Central Africa, from east to west. The numerous explorations in South and South-eastern Africa, from the Orange river to the Limpopo, and from that point along the Eastern Coast and its interior, as far as the parallel of Zanzibar, which, with the exploration of the imperfectly known parts of the Island of Madagascar by Grandidier and Mullins, is but a very general statement of what has been done in Africa. What exploration has accomplished in Africa may be judged by a single fact. In 1850 the area of cultivated land in Egypt was 2,000,000 of acres, in 1874 it was 5,000,000.

I may next refer to the numerous explorations around and across the great continent of Australia, from Sturt's early journey to the last ones of Warburton and Forster. The survey of large portions of the coast of Papua, or New Guinea, and explorations in the interior by Beccaria, D'Albertis, Meyer, Van Rosenberg and MacLeay. The explorations in Formosa by Steere, Le Gendre and others, and the settlement of colonies and the establishment of governments by the English in New Zealand and the Fiji Islands. The explorations of the Arctic to within sight of the 83° parallel of north latitude, including the discovery of the long-sought North-Western passage, and of its inutility. The exploration of the Antarctic circle as far as the 73° of south latitude, and the remarkable discovery that the ice-bound regions, both of the Arctic and Antarctic, was at a former period of the world's history covered with a luxuriant vegetation, and that plants and animals then existed there in great abundance, which are found now only in the tropics, or in the more southern parts of the temperate zone.

And finally our own explorations of the great western region, between the Mississippi and the Pacific, by Fremont, Emory, Simpson, Marcy, Stansbury, Sitgreaves, Gunnison, Beckwith, Whipple, Williamson, Parke, Warren, Ives, Reynolds, Macomb, Mullen, Wheeler and other gallant, efficient and distinguished military officers conducting reconnoissances or expeditions across its plains, deserts and mountains, accompanied in these expeditions by scientific civilians, to whose labors we are indebted for our knowledge of its

geology, agricultural resources and natural history. Among strictly scientific works by civilians I should also enumerate Whitney's Survey of California, followed by King and Gardner's belt of geological and topographical survey across the North American Cordilleras, Hayden and Gardner's survey in the Rocky Mountains, and Powell and Thompson's of the great cañons of the Colorado, through whose united labors so much of the geography of this vast region has become known; its great mountain ranges, extraordinary cañons, wonderful geysers, deeply interesting ruins of a pre-historic and semi-civilized people of whom we know but little; its lakes, rivers, majestic cataracts, broad areas of culturable land, already largely and to be still more extensively settled, and finally the millions it has yielded in gold and silver; a region so vast beyond the one hundredth meridian that it will be twenty years before we obtain proper maps of it, unless the government is more liberal in providing for its exploration and survey than it has hitherto been.

To these geographical labors and explorations within this period in various parts of the globe must also be added extensive researches of a geographical character, such as deep sea-dredgings for the investigation of the temperature of the ocean, the movements of submerged currents, the plant and animal life existing at great depths and the configuration of the bottom of the seas, the observation and study of oceanic currents and their cause, the distribution of heat north and south of the equator by the instrumentality of these currents, and its effects upon climate, as well as the effect of the currents from polar regions in modifying the heat of the equator. The meteorological observations in respect to the course of the winds; and the investigations of the laws and of the cause of hurricanes, cyclones and other aerial disturbances. The magnetic observations in elucidation of the difficult subject of terrestrial magnetism. The numerous measurements of great mountain heights in the more elevated regions of the globe. The extensive survey of coasts, prominent among which is our own great Coast Survey. The trigonometrical surveys carried on in many countries in Europe. The investigation of the cause of the glacial epoch, and possibly of inter-glacial epochs, or a succession of alternate warm and cold periods, each extending over long periods of time and their effect in bringing about the present condition of the earth's surface by changes in the level of the sea, and the submergence of the land.

This very inadequate statement will show how great, wide-spread

and constant has been the work of exploration and research within the period referred to and how truly it may be denominated a geographical age.

I shall now, in the discharge of my annual duty, proceed to give some account of the researches, discoveries and geographical work of the past year, beginning with an account of what has been done in our own country :

UNITED STATES.

The geographical explorations and labors in this country during the year, have consisted chiefly of the continuation of those heretofore begun by the government, and of which I have previously given an account. They embrace the labors of the Coast Survey, of the United States Corps of Engineers, the Smithsonian Institution, and the explorations and surveys under the direction of the Navy Department and of the department of the Interior, to the more important of which I shall hereafter individually refer.

Mr. Wm. H. Dall, who, in connection with the Coast Survey, has been engaged in labors upon the N. W. Coast of America, has, after careful observations, determined the height of Mount St. Elias, the highest mountain in the United States, to be 19,500 feet, with the possible error of 500 feet, Mount Fairweather, 15,500, and Mount Crillon 15,900, and ascertained approximatively the heights of Mounts Cook, Vancouver and La Perouse; and he is of opinion that these mountains are not of volcanic origin, as has been heretofore supposed.

The Signal Office at Washington, under Gen. A. J. Myer, has continued its system of daily weather maps for each of the great divisions into which the several States have been grouped, giving the character of the weather that is likely to follow in the next twenty-four hours in each division, as well as the actual weather experienced during the preceding twenty-four; the result of which has been a continued assurance of the value of the observations and of the dependence that can be placed upon them; in which connection I may remark that Dr. Kopper, of St. Petersburg, predicted, from his observations, in 1874, that the winter of 1875 would be an exceptionally severe one, which has been confirmed by the present winter in Europe.

THE WHEELER EXPEDITION.

The geographical expedition and surveys west of the one hundredth meridian, under Lieut. Wheeler, have been carried on during

the past year over certain areas in Southern and South-western Colorado and North-western New Mexico.

The report and accompanying papers this year are of exceeding interest, from their fullness, the care with which they have been prepared and the competency of the scientific gentleman connected with the survey.

These papers, which form the appendix to Lieut. Wheeler's report, embrace the geography, geology, the agricultural resources, the birds, quadrupeds, reptiles, the botany, the languages and characteristics of existing races, together with the remains, architectural and otherwise, of the pre-historic races that dwelt in Arizona, Colorado and New Mexico.

Lieut. Wheeler's impression of the general resources of South-western Colorado is extremely favorable. Better communication, he says, more settlers, and money for the development of its mines, is what is needed, for nature has supplied the earth with what the energetic industry of man can subjugate to his wants. And of this portion, and Northern Mexico, Dr. Loew, the mineralogist, says, that although a great portion of these regions would be of little use for agricultural purposes, from the limited rainfall, there are still quite a number of sections in which agricultural and pastoral pursuits can be carried on.

Dr. Rothrock gives the following general result of observations in the portions of Arizona and New Mexico traversed by him during the year: The soil possesses the elements requisite for vegetable growth, where water sufficient for irrigating purposes can be found, and nearly all portions accessible to water can be utilized for grazing. The forests contain timber enough for many years. Large areas, now abandoned for want of water, can be cultivated by a system of tanks, in which water can be stored when plentiful, and the waste of water in surface drainage and rapid evaporation can be lessened, so that the rainfall would be made to produce more lasting benefit; and finally, that the prevailing diseases are of less than the usual fatality, and will diminish as the country is brought under cultivation. He concludes with the observation that Utah, so large a portion of which is now covered with fertile farms, vineyards and orchards, was, a few years ago, as unpromising as either Arizona or New Mexico, and says that what are now waste places in Arizona and New Mexico, will, as the population of the Union increases, be redeemed and made tributary to civilization.

The reports of Professor Cope, the paleontologist; of Dr. Loew, the

mineralogist ; of Dr. Yarrow, the zoölogist, and of Lieut. Burney respecting their explorations of the ruined cities, burial places, dwellings, fortifications and other remains of the unknown people by whom this region, now occupied by savages (Apaches, Utes and Navajos), was once thickly populated is of great interest.

Prof. Cope found that what is called the eocene plateau of Northwestern New Mexico, where now there is no people, was once occupied by a numerous population, the evidence of which was found throughout the country in ruined buildings, pottery, flint implements and human bones. The conic hill-tops in many instances were crowned with stone structures, which, upon examination, proved to be ruined dwellings, within and about which fragments of pottery abounded. On one of the hills surrounded by a wall the remains of a town was found called Cristone. The wall at first appeared quite inaccessible, but by climbing round the eastern face of the precipice they discovered that it was ascended by a stair-case of stones, a number of which were still in position. Often the walls of these houses, though in some cases only the foundations remained, and on the almost inaccessible crest upon which this town was perched he could see similar ruins on an outlying hill.

In the Moquis villages of Arizona, described by Ives and Newberry, towns were perched on high eminences for the purpose of defense, but placed near some stream which enabled the inhabitants to carry on a system of agriculture ; but what was discovered last year in these ruined towns is very remarkable. There were no indications that the inhabitants had water at these great elevations, and no evidences that cisterns had ever been employed. Pottery was found distributed on the denuded hills for many miles, with every indication that this now unpeopled region of the Gallinas was formerly as populous as are now the more densely settled eastern or middle States, the number of buildings to the square mile being equal to, if not greater, than the number now existing in the rural districts of New Jersey and Pennsylvania. The extraordinary fact in connection with these ruined towns and dwellings is the remoteness of the larger proportion of them from water, many being a distance of twenty-five miles from the nearest source of supply. This is the more curious as there are no traces of cisterns, but only earthen water pots, narrow necked globular vessels, of comparatively small size. The existing Indian tribes who visit this region, at intervals, know nothing of the people who formerly inhabited it. No traces of

metals were found. On adjacent rocks there were Indian inscriptions and carvings. Dr. Loew explored ruins of the same character in New Mexico. In Aztlan, some of the ruins found were fortified structures, having as many as 500 rooms. Over the surrounding plain, solitary round buildings were profusely scattered, and all of these ruins are fifteen miles distant from any water. But in respect to these particular ruins in Aztlan they were told by the Indian guide that there were cisterns upon the mesas in which the rain had been caught. Upon the narrow ridge of one of the mesas, between colossal walls of sandstone, close to the frightful precipices of the cañons, the ruins of a town were found, of eighty houses, partly in parallel rows partly in squares, and partly perched in gaps between the over-hanging rocks. Nearly every house had one story and two rooms; the roofs had fallen in, with many of the side walls, and broken pottery, charred corn and primitive instruments for grinding corn were found. The position appeared impregnable, but the Indian guide told them that the Spainards took it and that the despair of the people was so great at its capture, that they threw themselves headlong into the frightful abyss below. The perils of life, he remarks, in a town like this or like Cristone, must have been considerable; infant sports had to be restricted within doors; and habits of intoxication could not have been indulged in, as a cool head was indispensable to avoid the fatal consequences of a slip or fall.

Another ruin was found on the river Chama, near Abiquiu, which was one of those elevated towns. They were told that near the walls skeletons might be found, which they could hardly credit, as Indians are not in the habit of burying their dead in the immediate vicinity of their towns. The statement, however, proved to be true, for the erosion made by water and the falling away of the earth, revealed places where skeletons existed; one of which was taken out entire and sent to Washington. It had been placed in the grave with the face downward, the head pointing to the south, an interesting and curious fact, as Dr. Yarrow states that he is not aware that this has ever before been noticed in the burial of the American aborigines. There is a superstition among the Indians that those who disturb the bones of the dead usually suffer ill-luck or perish violently. Mr. R. J. Ainsworth, the topographer, when he was removing this skeleton was admonished of this belief by his Indian guide, and three days afterwards the unfortunate gentleman was killed by the accidental discharge of a pistol in his own

hands, a circumstance calculated to impress still more deeply upon the Indians this prevalent superstition.

The explorers endeavored in vain to find from the Indians living in the vicinity of Abiquiu, some tradition regarding the town and burial places, but all they could say was, that it had been built during the time of Montezuma, and that their oldest people had never heard from their ancestors that any people had ever lived there. The indications here also were that this part of New Mexico had formerly been densely populated. In the Valley of the Chama alone they found the ruins of six or eight towns.

Grave mounds were examined upon the coast of South California, in Santa Barbara county, by an expedition dispatched from the survey for this purpose; and also by Mr. Schumacher, who last year furnished us with the interesting account of his explorations in Peru. When the Spaniards first visited this region the entire coast was inhabited by a vast number of Indians, and their grave mounds and the ruins of their villages exist from one extent of it to the other, but at the present day not even a remnant of these tribes remain. The grave mounds extend over a period long before and after the arrival of the Spaniards. A great number of articles were found, some sculptured with artistic skill, and, amongst other interesting objects, quantities of glass beads, which Dr. Rau has identified as of Venetian workmanship.

Lieut. Burney met with extensive ruins on the right bank of Las Animas River, twelve miles above its junction with the San Juan, and 517 rooms were counted in one pueblo alone. These ruins covered what had formerly been quite a town, but my space will not allow me to go farther into the details of this very interesting discovery.

THE BLACK HILLS.

The report of the existence of gold fields in the Black Hills of Dakota and Wyoming, led, during the year, to a large emigration of miners to this region, threatening serious conflicts with the Sioux, to whom it was reserved by treaty. The government, in consequence, dispatched a strong military expedition under Lieut. Col. R. J. Dodge, with which was connected an efficient scientific corps for geographical and geological explorations; the object of the exploration being to remove the miners from the Hills and to effect a treaty for the purchase, if possible, of the country from the Indians. The expedition reached the south-west slope of the Black Hills, upon a tributary of

the Cheyenne, about 120 miles due north of Fort Laramie, from whence an opportunity was afforded to the scientific party to pursue their researches in the surrounding country; and another camp was established near French Creek, the route between being through a beautiful mountain country, where there was pure water in the streams, and abundant game in places.

The miners were driven out, but the expedition failed to effect a treaty for the purchase of the country, the Indians demanding an exorbitant sum. The scientific party, however, under Prof. W. P. Jenny, spent five months in the Hills and made an extensive examination of the country, mapping it from Belle Fourche to the South Fork of the Cheyenne river.

This exploration confirms the accounts given heretofore of this valuable region. The valleys are well adapted for agriculture and the cañons for stock raising; the rainfall is plentiful, timber abundant, and Prof. Jenny says the Hills will support thousands of miners when the government opens them for settlement. The gold fields are almost wholly in Dakota, extending about fifty miles north and south from Harney's Peak, and covering an area of at least 800 square miles. The most valuable gold deposits, however, are found in the valleys of the streams which drain this area, the gold being derived from the disintegration of quartz rock. These gold fields are not sufficiently rich, however, to be worked in the usual primitive manner, but to be remunerative will require a moderate outlay of capital.

The Black Hills, says Prof. Jenny, rise like an island from an ocean of grass and tree-covered plains. The wind in passing over these plains gathers moisture, which it parts with as rain, when coming in contact with the elevated region of the central portion of the hills. The climate is very healthy, although the amount of land suitable for cultivation is limited as compared with the vast area of the hills. Along the streams and in most of the valleys, however, the soil is deep and fertile, and Prof. Jenny was of opinion that at least $\frac{1}{10}$ of the 3,000 square miles is arable land, and that the slopes of the hill-sides, though not arable, will afford good grazing, as throughout the whole area there is a luxuriant growth of the finest grass, making it a region exceedingly well adapted to the raising of cattle.

A writer in the *Herald* describes the country through which the expedition marched as one of unsurpassed beauty. Valleys, he says, were passed, watered by a thousand springs running into streams,

which wound their way through the verdure beneath the woods that mantle the hill-sides. There was no evidence that the Indians had ever lived in those hills, the reason suggested being the great prevalence of thunder storms and the frequency with which the trees are struck by lightning. The highest point — Harney's Peak — is about 7,400 feet above the level of the sea. The general level of the rest is from 500 to 1,000 feet lower. The valleys, however, cutting through the hills, are 2,000 to 3,000 feet below the peak. On the west, extending north, is a broad mesne or table-land. Harney's Peak, with its surrounding peaks, seems to be the true center of the hills; but this whole mountain region is exceedingly elevated as well as the drainage system. A remarkable feature in the geography is the many long and deep cañons through which the streams flow, the cañons being exceedingly impressive from their depths and their magnitude. They range in depth from 200 to 600 feet. The topographical work and the mapping was done by Dr. V. T. McGillycuddy and Capt. H. P. Tuttle, and the geology of the hills was worked up by Mr. I. Newton of this city. The geographical features of the region are especially interesting; and the scenery, which is startling and impressive, abounds in remarkable natural objects, of which photographs were taken. We expect, in the course of this winter, to have an evening when Mr. Newton, the geologist, will give us a detailed account of this exploration with stereopticon views of its remarkable scenery.

Capt. Ludlow, U. S. E., whose reconnoissance in the Black Hills of Dakota I referred to last year, has made his report to the government which contains both a geological and geographical map of the hills and an extensive detail of valuable geographical information.

HAYDEN'S SURVEY.

The United States Geological and Geographical Survey of the Territories, Prof. F. V. Hayden, geologist, in charge, continued its work in Colorado Territory.

The six field parties left Washington June first, Mr. Jas. T. Gardner, geographer, having general charge of the field work. One of the parties was organized for triangulation, one for photography and four for geological and topographical works. They remained in the mountains till November. Some 25,000 square miles were surveyed in the south-western corner of the territory, which is an especially interesting region. The elevated and massive part of the Rocky

Mountains terminates here in the San Juan group of ridges where over fifty peaks exceed 13,000 feet in altitude and many reach 14,000 feet, their slopes being rich with silver and gold veins. The lofty and desolate heights which cover so much of this area and the hostility of Indians successfully repelled "prospectors" until 1872 and 1873. Since then over 3,000 gold and silver claims have been discovered and recorded. Heretofore the richest ores have been packed upon the backs of mules and shipped to Denver at great expense, but during the past season roads were completed which penetrate the wildest districts and capitalists are preparing to send in large quantities of machinery. The survey has already published a preliminary map and a geological and topographical report upon this very promising part of our territory. Around the mountains, contrasting strongly with their precipitous slopes and fine forests, sweep the great desert plateaus of Western Colorado, Arizona and Northern New Mexico; formed largely of horizontal cretaceous rocks, whose level-looking table-lands are intersected with labyrinths of rock-walled cañons, from a few hundred to 6,000 feet deep. The almost inaccessible ledges and caverns of these cliffs, are in places lined with ruined dwellings of a race now nearly extinct, known as the Pueblos, or town building people. The work of the survey in discovering many of these ruins, mapping their positions, making measurements and plans of the buildings, with photographs to illustrate the different kinds of masonry, and collections of skeletons, implements, pottery, etc., forms one of the most interesting parts of their labors. A number of large and perfect water jars were found and brought to Washington. Thirty-six different kinds of ornamentation were counted on the pottery at one ruin, upon which trees grew not less than 300 years old. The buildings were of hewn stone. No trace of metals was found. The implements were stone axes, chisels, etc. Where chopped wood was seen, the work appeared to have been done with stone.

The survey of Colorado is completed, excepting a small part of the north-west corner. The Sierra La Sal Mountains, where Mr. Gardner's party was assaulted by Indians, are not known to have been visited before by whites. With six armed men and six unarmed assistants, Mr. Gardner penetrated this heretofore unexplored region, and after leaving the mountains was attacked by twenty-five or thirty mounted Indians in a waterless valley walled with cliffs. The party were already suffering from thirst and were searching for water when

assailed. It was only after nineteen hours fighting that they succeeded in escaping up the rocks by a deer-trail. They were two days and a night without water in a desert climate, where men require ten or twelve times as much water as here. By out-manceuvring the Indians and fighting, like them, under cover, the explorers saved their lives.

Mr. Jackson, with the photographic division, visited the Moqui towns in Northern Arizona, inhabited by a remnant of the Pueblo race. He obtained many interesting pictures of the people and houses, with collections that illustrate their customs and arts. A preliminary map accompanies the Hayden Report for 1874, giving, in a generalized form, the topographical results obtained up to May, 1875. The final maps are being engraved on a scale of four miles to the inch, and will not be published under a year. Large models have been constructed of parts of the mountains and of the most important ruins; so that those who cannot visit them may thoroughly understand their appearance.

PROF. J. W. POWELL'S EXPLORATION OF THE COLORADO.

Professor Powell's exploration of the Colorado river, which was heretofore carried on under the direction of the Smithsonian Institution, now forms the second division of the United States Geological Survey of the Territories, the geographical department being in charge of Prof. A. H. Thompson. Prof. Powell, with a small party in the field, has accomplished a great deal, but before referring to the labors of the past year, I desire especially to express the society's high appreciation of Prof. Powell's recent admirable report upon his exploration of the Colorado river and its tributaries from 1869 to 1872. The graphic and lucid account he has given of the singular country of the cañons, has enabled me for the first time to get a clear and general conception of this extraordinary region, and of the physical causes — operating slowly over long periods of time — that have produced it. He has also, in this publication, and by his collections and ethnological researches, added largely to our knowledge of Indian races, their pursuits, mode of life, customs and history.

The exploration last year was, to a large extent, under the direction of Prof. A. H. Thompson, the geographer of the division. The main party was engaged in exploring a region little known — the south-eastern corner of Utah — and another portion of it was studying a region about 200 miles south of Salt Lake City, having an area of from 5,000 to 6,000 square miles, composed almost wholly of vol-

canic rocks, and presenting the volcanic phenomena upon a great scale, highly varied and complex. The central point of operation was Gunnison, a small Mormon town, 140 miles south of Salt Lake, where the great Wahsach range of mountains terminate. This investigation was chiefly geological, but its geographical features are interesting. Its scenery is wonderful and very impressive. A striking feature is the lofty plateaus, which have led Prof. Powell to call it the plateau country. Of these plateaus the Aquarius is the loftiest and most extensive, covering an area of nearly 10,000 square miles, from the Henry Mountains on the north to the Kaiparowitz Plateau on the south, and the Colorado river on the east to the Aquarius Plateau on the west. Although the Sevier Plateau is the one where the volcanic features are the most extensive, having been the scene of volcanic action for a very long period, and continued intermittently until a period comparatively recent. This volcanic region is in marked contrast with the surrounding country. It is from 2,000 to 6,000 feet higher, sharply cut by deep gorges and ravines, but never by cañons. The loftier positions are well wooded and watered, with abundant grass and game and a rich soil close to the lower part of the mountain slopes; but it is a rugged country, where travel is obstructed and observation difficult. Capt. C. E. Dutton of the Ordnance Corps, whom I presume to be the author of an article in the Tribune from which these facts are derived, says that a month's journey through the country proved both delightful and instructive. With the exception of one small valley the whole region is uninhabited. The climate is too rigorous for much agriculture, and in the higher valleys few nights pass without frost, few days without rain or snow, yet the luxuriance of the Alpine vegetation is remarkable. "We tread knee deep," says the writer, "in long succulent grasses with many flowers looking as if their proper place was a hot-house." The rivers, lakes and small streams are alive with trout. Many streams that lead down the volcanic precipices form, in the midst of the mountains, a lake of the clearest waters called Fish Lake, which lake and the streams forming it are filled with salmon trout. They refuse the hook, but the streams are so small, pebbly, and the number of fish so great, that one may stand astride in the stream and throw them out rapidly with the hand. The common brook trout is very abundant and caught with the hook, baited with grasshoppers.

Prof. Thompson's party discovered the ruins of many pre-historic dwellings, and also on the cañon wall escarpments many Shi-ni-mo

etchings and inscriptions which were copied. During his journey Major Powell met some tribes of the Shoshone Indians, whose arts were unrepresented in the National Museum at Washington, enabling him to make collections of their arms, clothing, implements, etc., by which these Indians will now be as fully represented in that museum as the Utes or Piutes. Mr. F. S. Ward, the botanist, made large collections bearing upon the geographical distribution of plants, and Mr. J. K. Hilliard made numerous photographs for geological and ethnographical purposes. I close my account of this interesting exploration with Major Powell's observation, that the result of this year's labor had been more satisfactory than those of any previous years.

PRE-HISTORIC.

ANCIENT INHABITANTS OF AMERICA.

Other explorations and expeditions have been made during the year in reference to the pre-historic inhabitants of America, for the detail of which I am mainly indebted to Prof. F. W. Putnam, the archæologist of the Peabody Museum.

Dr. Farquharson has examined a number of mounds near Davenport, in Ohio, resulting in the discovery of numerous articles, such as pipes carved in the form of various animals, copper axes covered with cloth, the fibers of the cloth showing the high state the mound builders had attained in the art of weaving. Mr. Strong has also examined mines near Kent, Michigan, and has discovered a number of implements. Mounds have been explored by Mr. H. Parry on the St. Clara river, in Utah; by Mr. H. Gilman on the river Rouge, in Michigan; by Prof. Andrews, in Ohio; and by the Kentucky Geological Survey, near Cumberland. In the latter exploration a fragment of painted pottery (which is unusual) was found. A human tibia, found by Mr. Gilman in the river Rouge mounds, is the flattest yet discovered. Archæological Societies have been established in Ohio, Indiana, Tennessee and Wisconsin for the further prosecution of these inquiries.

The memoir of the late Prof. J. Wyman, upon the shell heap mounds and pre-historic remains on the St. Johns river in Florida, close to the Atlantic coast, has been published during the year by the Peabody Academy of Sciences. It is an exhaustive memoir not only in relation to the pre-historic remains in that locality, but for the large amount of information brought together to show the extent to which cannibalism prevailed among the earlier inhabitants of North

and South America. The shell-heap mounds on the St. John's river, are the remains of a people who were neither agriculturists nor hunters, but who lived upon shell-fish. This is evident from the quantity of the shell-mounds and the rude state of the arts among these people who are supposed to have been of the Carib race. Fragments of pottery were found, although not in the oldest mounds, and also fire-places and tools, and implements of stone, bone and shell; stone implements, however, being rare. Human bones were found, but so broken and distributed as to make it obvious that they had not been deposited in graves, but were the remains of cannibal feasts. The age of these mounds can be fixed only approximatively. Trees growing over them, and other indications, show that they existed at least two or three hundred years before the discovery of Florida. Drinking cups were found made from the conch shell which exists so abundantly upon the Atlantic and the Gulf coast. These drinking cups and other objects made from these shells, are traced not only through Florida but up the Mississippi and its branches to the great lakes, showing that there must have been, among the aborigines, a large traffic in these drinking shells, which, it is supposed, were all made either in this Florida mound region, or on the shores of the Gulf of Mexico.

Prof. J. D. Whitney, from the remains found by him in California, is of the opinion that man existed there as long ago as the tertiary period; that he was then the maker of instruments for grinding corn, as well as other implements of stone, and, as far as the examination of the imperfect skull, which was found, warrants a conclusion, that he was, at that remote period, the same anatomically as he is now. These discoveries of Prof. Whitney's go to show that man existed during the glacial epoch, which is confirmed after seven years examination of the deposits in the Victoria Cave in England, and by recent discoveries in the inter-glacial coal beds of Switzerland. The glacial epoch is computed by Mr. Croll, in his recent work, to have ended about 80,000 years ago; and Mr. Croll is not only one of the best authorities, but the one whose estimate of the time is the lowest.

It is said that M. Greenbot, in plowing land in Bass county, Kentucky, during the year, discovered the remains of a city with regular streets, curbed with stone, and evincing a higher order of civilization than any other pre-historic remains in the country. It is also said that at Palatka, in Florida, upon the grounds of Col. Hart, a mound was opened, containing a carefully constructed chamber, in which

petrified bodies were found in an upright position, with arms, implements and other objects. These statements, however, rest entirely upon newspaper reports, which are so frequently fabricated that they cannot be accepted as true accounts of actual discoveries until the facts are confirmed.

The researches and discoveries made this year alone, in respect to the pre-historic races of America show how extensively this subject is undergoing investigation, and what a flood of light has been shed upon it. Thirty years ago I attended a public lecture in this city, together with the late Drs. Hawks and Francis, by a gentleman who had given great attention to the subject, and there were five persons present.

BRITISH AMERICA.

The Abbé Petitot, who has been engaged since 1862 in missionary labors along the course of the Mackenzie river and in the country adjacent to the Great Bear and Great Slave lakes, laid, during the year, before the Paris Geographical Society, a large amount of information respecting this region, and of the researches of various travelers, whose information is not represented upon existing maps. He says that Mr. Bell, in 1840, was the first who penetrated into Alaska from the Arctic side of the Rocky Mountains. The Abbé's account is too extensive to enable me to give in my discourse even an epitome of it. I can only say that he has corrected a great many errors furnished a large number of new facts, and that he is one of that numerous class of valuable missionaries who have done so much for geographical knowledge while occupied in their religious labors.

CENTRAL AND SOUTH AMERICA.

The surveys for a ship-canal from the Atlantic to the Pacific; the one by Lieut. Collins, by the way of the river Atrato, and the other by Commander Lull, across Nicaragua, have been completed, and the reports of these officers will be published by the government. Lieut. Collins' account has already been laid before the Society, and I shall defer any further consideration of the subject until the government reports have been published.

Prof. Wm. M. Gabb has continued his exploration of Costa Rica, which has heretofore been confined to the Atlantic slope, but which he purposes to extend to the country bordering on the Pacific Coast. He has surveyed Tolamanca, from the borders of civilization on the north, to the borders of Panama, and from the Atlantic to the crest of the

Cordilleras, a rich agricultural country peopled only by 1,266 Indians. His ethnological researches and collections in natural history are exceedingly valuable.

A *boiling lake* has been discovered in the island of Dominica, two miles in circumference, on a mountain covered by a forest, 2,500 feet above the level of the sea. The water which rises four feet above the general surface, and pours over the sides with a sulphurous vapor, is charged with sulphur and decomposed rock; and as the surface is gradually becoming lower, Mr. Presto, the observer, is of opinion that the lake will be gradually destroyed and converted into a geyser.

Mr. Marguin made an exploration in Terra del Fuego, from $55^{\circ} 20'$ to $52^{\circ} 50'$ S. lat. chiefly by water, from Cape Expectation along the eastern shores of Dawson Island, and from thence to Terra del Fuego, as far as Philip and Gente Bays, and has given an interesting account of the geography, geology, climate and inhabitants of this inhospitable region, where winter prevails for nine months of the year. He had some intercourse with the inhabitants, who he says are not as large nor as strong as the Patagonians. The marvel is that human beings should be found inhabiting this extreme region, where the struggle for existence against the climate is not only terrible, but in addition the people are exposed to constant attacks from the savages of the coast. A narrow channel in this quarter, from the Atlantic to the Pacific, is said to have been recently discovered 150 miles in length, and is said to be navigable. If this should prove to be true it will greatly shorten the passage between the two oceans, as the present route through Magellan's Straits is 315 miles. A British frigate, the *Opal*, has been detailed to investigate it.

The expedition dispatched by the Hamburg Geographical Society under Captain Dolman, has made an exploration of Graham Land, in the Antarctic, and where Bisco, the discoverer of that land, in 1832, saw nothing but a continuous coast line, Captain Dolman discovered a strait fifteen to eighteen nautical miles wide, with highlands between as far as the eye could reach, and also an archipelago of islands, sixty nautical miles in extent, which he has called King William's Land.

ARCTIC.

The important Arctic event, during the year, has been the dispatch of the expedition so long urged upon the British government by the Royal Geographical Society for the discovery of the Pole and scientific research. It is under the command of Captain Nares, who, until

recently, commanded the *Challenger*, and consists of two ships, the "Albert" and the "Discovery," one of which is in charge of Commander Markham, who, it will be remembered, returned in the "Dundee" with the remainder of the officers and crew of Captain Hall's expedition. The expedition left last June and has taken the route by way of Smith Sound, the one followed by Kane, Hayes, and Hall, and uniformly urged by this society as the best. This is a marked change in English opinion. Admirals Osborn, Inglefield, Sir Lionel McClintock and Mr. Clements R. Markham, the Secretary of the Royal Geographical Society, have heretofore advocated this route, but the great body of Arctic explorers and geographers in England have, until recently, agreed in opinion with Dr. Petermann, the eminent German geographer, that the most practical route by which to reach the Pole was east or west of Spitzbergen. The result of Hall's expedition, however, in sailing unobstructed through Smith Sound and Kennedy and Robeson Channel to $82^{\circ} 16'$ north latitude, has entirely changed the current of opinion, and Dr. Petermann, together with the great body of the English Arctic explorers, have, with great unanimity, united in recommending that this English expedition should go through the Smith Sound, following up the track of Kane, Hayes and Hall. The expedition when last heard from had a favorable passage into Smith Sound, and, as it is well equipped and under an experienced Arctic explorer, Captain Nares, great hopes are entertained that it will succeed in reaching the Pole, either by water or by sledging, but whether or not, the scientific researches to be made will entirely warrant the sending of it out.

Before its departure a crowded meeting was held of the Royal Geographical Society, at which the officers of the expedition were present and most of the distinguished Arctic explorers, several of whom expressed their views, in a lengthened discussion, of great interest upon its objects and prospects. Admiral Richards paid a high compliment to our people. No people, he said, had shown a greater interest in Arctic exploration; that when all further hopes were abandoned by the English in the direction of the North Pole, a restless and enterprising spirit existed with us, and that we persevered for years until we accomplished results which he said must be admitted by all to have been at least unsurpassed. Admiral Ommann, formerly a prominent opponent of the route now adopted, also said that England must be grateful to her American cousins who had cleared the way by successful operations through Smith Sound.

When it is remembered that our early efforts in this direction were ignored, that the name of Grinnell Land in Wellington Channel was at first omitted upon English maps and the name of a subsequent English explorer substituted, that our route by the way of Smith Sound received little support except from Admiral Sherrard Osborn, Admiral Inglefield and Mr. Clements R. Markham, this change of opinion and hearty recognition now, is very gratifying, especially to our member, Dr. Hayes, the only one of our exploring commanders in the Arctic who is now alive.

Admiral Richards recommended the plan uniformly advocated by Dr. Hayes, that one vessel alone should endeavor to push northward to the Pole, leaving another in a safe position to communicate with in the event of disaster. He was of opinion, from what is known, that there is no continent or great mass of land in the polar area north of Greenland, and that if navigable or partly navigable water were found, it was possible that short work might be made of reaching the Pole; but if there was continuous land, along the shore of which sledges could travel, then a very high latitude or probably the Pole might be reached by sledging, although the distance to be accomplished by sledges and boats combined, would necessarily be a very limited one. He remarked that all that human foresight could devise had been done to ensure success, and that the design of the admiralty was, that if the expedition did not return before 1877, a vessel would then be sent to Smith Sound. Admiral Collinson thought that by following the land they would get further north than had yet been attained. Admiral Sir Lionel McClintock was of opinion that if the vessel reached as far as Hall's — 82° — which would be within 500 miles of the Pole, and such ice was met with as was commonly found in Lancaster Sound, that the expedition would, without doubt, reach as far as the Pole, and having had himself great experience in sledging, he made a very valuable statement as to the most practicable way in which the sledge expeditions should be conducted. Captain David Gray was of the opinion that Smith Sound was merely an inlet, as the tide there rises eighteen feet, with southerly winds, whereas on the south of Melville Bay, the rise and fall of the tide was only between five and six feet. He thought that this high tide was the result of the southerly wind forcing the water up a narrow inlet, and that if there was any connection between Smith Sound and the Polar Sea, the tide would bring the ice down, but that if the tide was met at Cape Frazer then Smith Sound must communicate with the polar basin.

NORDENSKJÖLD'S EXPEDITION.

A Swedish Arctic expedition, under Prof. Nordenskjöld, was dispatched last summer in the "Proven" at the expense of a single individual, O. Dickson, Esq., of Gottenborg. Its object was to pass around Nova Zembla and the north and go as far as the mouth of the Obi and the Yenisei, which, it was supposed, would be rich in the bones of the mammoth and in prehistoric remains. The vessel arrived at the southern part of Nova Zembla on the twenty-second of June last, and being unable from the ice to get to the northward, some weeks were occupied in zoölogical, geological and botanical researches, when the vessel sailed southward and succeeded in getting through the Zugorski Shar, the straits between Waigatz and the mainland of Northern Russia, into the sea of Kara, which they found wholly free of ice, and by dredging and observations for temperature, ascertained that no warm under current exists in the Kara sea. They penetrated as far as $75^{\circ} 30'$ north latitude, when they sailed for the Yenisei, which the professor and his friends ascended in a boat to Dudinka, a village where Prof. Nordenskjöld left the Proven; the vessel returning to Norway, while he made his way across Siberia to Tomsk, and from thence to St. Petersburg, where he was warmly received by the Imperial Russian Geographical Society.

The expedition ascertained that there was a fine harbor at North East Island, and found the mouths of the Obi and the Yenisei quite free from ice, and though shallow, sufficient for the establishment of trade between Europe and Siberia; which will enable the rich products of Siberia to find an outlet along her great rivers. They landed at a place in the mouth of the Yenisei, known as Christowski, formerly inhabited in summer and winter, where they saw houses, which, judging from their interior fittings, must have been once handsome residences. There were three of those dwellings with flat turf-covered roofs, each of which the professor says, in his report, had a labyrinth of dwelling apartments, bake-houses, bathing places, store-rooms for provisions, fuel, etc. Every thing was in great confusion; no furniture was to be seen; even the nails had been taken from the walls, and when they reached Dudinka, they learned that the inhabitants of the place had left it some centuries ago. Gortschiga was found to be the most northerly inhabited place on the Yenisei, which was occupied by a small number of fishermen and hunters. The natives of the region were Samoyedes, Dolganes and Ikutes. The river had a great variety of fish, of which they collected a number of specimens.

They were still north of the limits of the polar circle, which might be supposed to be a region covered with ice and snow, but on the contrary they found the vegetation most luxuriant and beautiful. The great richness of the grass fields in fact excited the remark of one of their companions, a farmer-fisherman at home, that it was a pity that God had given so splendid a country to the Russians where there was no one to cut the grass; an observation constantly repeated when they came to the splendid woods and rich black soil between Jeniseisk and Turnchausk, a region wholly uninhabited, which for fertility the professor says may be compared with the best parts of Sweden, and is larger in extent than the whole Scandinavian Peninsula. They heard in their journey that three different Russian expeditions had been dispatched for the exploration of the country. Though north of the polar circle they found what he declares to be the finest timber upon the globe, and south of these forests there stretches a fertile soil waiting for the husbandman and the plow. I have, he says, before me while writing a cluster of magnificent Siberian grapes which is strange news of a region heretofore supposed to be dreary and barren from its proximity to the pole. Prof. Nordenskjöld says: I entertain the most profound conviction that a new commercial route has been opened, the importance of which can only be adequately conceived by a knowledge of the vast tracts of country watered by the Obi, the Irtysh and by the Yenesei and their tributaries. The return of the *Proven*, from the course of the vessel, indicated a strong north-westerly current flowing from the mouth of the Obi and Yenisei over the Kara Sea. The examination of the sea showed that the bottom was uncommonly rich in animal life and marine vegetation, which is interesting, for the Kara Sea has heretofore been represented as devoid of all vegetable life, for vegetation on the land is exceedingly scanty, the surface conveying the impression of utter desolation. The commander of the *Proven*, Dr. T. Kjellman, writing to Stockholm, says: "We have, during the summer, sailed over known and unknown seas more than 6,000 English miles, have visited regions where expeditions for more than 300 years have vainly attempted to go, and have made rich collections in all departments of natural science."

A marine survey is being made by the Russians of the coast of Eastern Siberia, from the Imperial harbor to Plaston Bay, and astronomical positions and levels have also been taken in the same vicinity.

VOYAGE OF THE PANDORA.

An expedition fitted out at the joint expense of Captain Allen Young, Lady Franklin and Mr. James Gordon Bennett, the proprietor of the *New York Herald*, consisting of a single vessel, the screw steamer *Pandora*, left on the twenty-fifth of last June for the purpose of exploring Lancaster Sound, and to reach, if possible, King William's Island, that a more thorough search might be made for the relics of Sir John Franklin's expedition. The steamer had what is unusual, a fine passage through Melville Bay, and though on entering Lancaster Sound, a large barrier of ice was found, Captain Young was able to get around it by an opening along the southern shore. The *Pandora* then reached Beechey Island, where they found the yacht which Capt. Ross had drawn up there on the beach in 1850, still in good condition, with masts upright, and upon going on shore, they examined the storehouse which had been built for the benefit of castaway or ice-bound sailors. Upon entering the building, the clothing and provisions left there were in the greatest confusion. Every thing was scattered about as though by human beings, but upon further investigation it proved to be the work of polar bears, the track of these animals being visible in every direction, inside and outside of the building, which they had broken open. The milk was well preserved, but had lost much of its virtue in twenty-two years. One of the sailors of the *Pandora*, now an old, grizzled, weather-beaten sea-dog, had been with Ross, and had assisted to build this house, which was now carefully repaired and secured against further attack from the bears. They found the headboards over the graves of Sir John Franklin's men, still upright, and the monument over the grave of Lieut. Bellot, the young Frenchman, who lost his life in the search for Sir John Franklin. The vessel then sailed for Peel Sound where she encountered large fields of pack ice, through which, however, she worked her way, passing the farthest point reached by the *Fox* in McClintock's search, and steamed down the coast of North Somerset in fine weather, with warm air currents, and an open expanse of water, which created the most intense excitement, from the hope that they might find the traces of Sir John Franklin's expedition, perhaps discover his papers, and possibly make their way out through Behring Straits, but upon reaching Roquette Island, within ten miles of Bellots Straits, they found a solid pack of ice stretching across the strait, and blocking up the entrance into Bellots Straits. King William's Island might have been reached, as it was then but 150 miles distant, but as

this would have involved the risk of wintering in that region, and the vessel was provided with provisions for only one winter, Capt. Young prudently determined to return whilst he had the opportunity, and to make another attempt in the same vessel the coming summer. He brought with him the letters left by Capt. Nares, the last intelligence we have had of that expedition and of its successful entrance into Smith's Sound. The Pandora, although it did not accomplish all that was aimed at, penetrated further into Peel's Sound than had been effected by any other vessel.

GENERAL ARCTIC MATTERS.

Capt. Gunderson, of the schooner *Rejina*, discovered on the north coast of Nova Zembla in excellent preservation the journal kept by Barentz, the Dutch navigator, in his voyage 295 years ago, the entries in which were up to the first of June, 1580. The journal does not relate to his last voyage which was from 1596 to 1597. The Norwegian government has organized an expedition which is to go out this year for the scientific exploration of the sea between Iceland, the Faroe Islands, Spitzbergen and Jan Meyen. Dr. Rink, who has given great attention to the geography of Greenland, thinks that the continent might be crossed from coast to coast; that it probably consists of a number of islands held together by the universal ice-covering; that the so-called interior ice is probably only a wall, within which may be found valleys, free from snow or ice, and possibly even wooded. Icebergs, in the North Atlantic have been unusually numerous during the year, and the fogs in Labrador and Newfoundland extraordinary and frequent. Lieuts. Weyprecht and Payer, of the late Austrain expedition, have, in a recent publication, expressed their conviction that there is no ground for assuming the existence of an open sea at the pole, nor for inferring the existence of the Gulf Stream in these waters, from the drifting of their ship, and they say that a passage to the east, taking the Siberian Coast in that direction, has not been negatived by the experience of their expedition.

The geographical results of the Polar expedition continue to be worked out by Dr. Bessels. The magnetic observations are more complete than any hitherto made in the Polar regions; the observations upon tides were made with great care. The current in Smith Sound running southward, was at a rate which varied from one to five miles, carrying with it much drift wood, which was coniferous, indicating that it came from a cold climate. The fauna and flora of Hall's

Land was very rich, but nearly all the specimens collected were lost. Drift wood was found at an elevation of 1,800 feet above the sea, along with shells and mollusks, which still exist in the water below, very positive evidence of either the gradual elevation of this part of Greenland or of a great change at a former period in the sea level. Many erratic blocks were seen, not borne by glaciers, but transported by floating icebergs, indicating that at one time the current in Davis' Strait was from south to north, which is different from what it is now ; and Dr. Bessels believes that Greenland has at some time been separated from the American Continent, in a direction from south to north.

A Dutch Arctic expedition is about being organized by influential members of the Dutch Geographical Society, residing in the ancient town of Enkhuizen, with the object of renewing, if practicable, the Arctic whaling business formerly carried on so extensively in Enkhuizen, Middleburgh and other of the dead Dutch cities, the trade of which is now limited to a small commerce in herrings and the making of the cheese so well known throughout the world. The design is to connect with the whaling business the advancement of science, a thing entirely practicable as the maritime people of Holland, as a rule, are well educated, and the commanders of vessels are frequently men of considerable scientific attainments. It is something that the Dutch are considering the subject of Arctic exploration, for though proverbially slow to move when once started they rarely relax but quietly go on to the attainment of the end. A people so practical that they seldom trouble themselves to think about any thing deliberately unless there is something in it ; and when a Dutchman ponders over a matter you may be tolerably certain that something practical will be the result. They have heretofore been among the most eminent of Arctic explorers, and it will be gratifying to see them again in the field where their forefathers have won such well earned laurels.

An expedition for exploration between Greenland and Spitzbergen is organizing in Germany to be sent out in 1877, but its departure will probably depend upon whether aid will be given by the government. The plan is to establish a principal station at the west coast of Greenland, and minor stations on Jan Meyen Island, and at the western extremity of Spitzbergen where provisions can be kept.

An expedition from this country has been talked of, under the command of Capt. B. S. Osborn, this spring, in which practical navi-

gators only are to be allowed to join. I know nothing about it, however, except from statements in the newspapers.

SYMMES' HOLE.

About the year 1819, Capt. J. C. Symmes, an officer of the regular army of the United States, advanced a theory, to the propagation of which he devoted the remainder of his life, that the earth was hollow, was inhabited within and had an opening at the pole, which became known throughout the country as Symmes' Hole. He pressed the subject upon Congress, urged an expedition to the pole to test his theory and a Russian gentleman is said to have offered to fit one out if Symmes would conduct it under the auspices of Russia, which the captain declined on the ground that the honor of establishing the theory should belong to the United States. He went over the country delivering lectures in support of this theory, in which he firmly believed to the day of his death. His son, now an old man, has revived it, and is advocating it as his father did by delivering public lectures. The father's theory was that this hole, or opening, in the Arctic was about 1,000 miles in diameter and somewhat wider at the Antarctic; and now that we have reached within 500 miles of the Arctic pole, about half of the assumed diameter of the hole, without any indication so far of its existence, the son believes that if Capt. Hall had got several degrees further north he would have found evidence of the truth of the theory.

Capt. Hall startled us at the reception given to him and his officers by this society, before the departure of the *Polaris*, by announcing publicly to us his belief in the existence of this hole, and of his determination to go in pursuit of it; a belief which, being an uneducated man and but little acquainted with the geography of the Arctic, was firmly fixed in his mind. It was in pursuit of this supposed hole that he meant to attempt the passage to the Pole by the way of Jones' Sound. I pointed out to him the impracticability of an attempt through Jones' Sound, and urged him to go as Kane and Hayes had done, by the way of Smith Sound, which course he ultimately adopted when advised to the same effect by Baron Van Otten of the Swedish expedition, whom he met during his voyage at Holsteinberg in Davis Strait.

In a letter put forth last February by Mr. Symmes, he not only argues that the earth is hollow, but that it has as much inhabitable surface within as without. He imagines that the inside is inhabited

by human beings who are the progenitors of the white race now upon the outer surface, and that there are apertures at the poles four or more hundred miles in diameter. This recalls the belief as to the cause of the earth's motion in the middle ages, when it became apparent from the researches of Copernicus and Galileo that it revolved upon its axis, which accounted for the motion by supposing that the interior of the earth was hollow, and was the place to which the damned were condemned, who produced the motion by their continual attempts to climb up the inside of this hollow ball in their fruitless efforts to get out. A wood-cut representing this strange belief will be found in an old cosmography in our library.

Another contributor to this realm of imaginary geography is a former Arctic explorer, Capt. J. M. Wood of the royal navy, who accompanied Sir James Ross in 1848, and whose theory in a recent letter is, that Sir John Franklin was lost in a maelstrom which swallowed up his whole party in the immediate vicinity of the Pole; the belief of the captain being that there is an open sea at either Pole; that Franklin, when his vessel was blocked by ice, set out in sledging parties to reach the Pole and discovering open water ventured upon it, when he found himself involved in rapid circling currents, which became stronger near the Pole, until he was finally drawn into the vortex of a gigantic whirlpool, where the boats were either engulfed or incessantly whirled about until they were crushed to pieces. This rotary motion at the Pole, he supposes, is produced by the moon's attraction, causing two sweeping tides, once in every twenty-four hours, which in other parts of the earth are resisted by the continents, but which, at the Pole, he assumes to be a continually lessening spiral of revolving waters, forming towards the center his imaginary maelstrom. I mention these circumstances to show that even in this scientific age, theories are seriously advanced with about as much to support them as the crudities advocated in the middle ages.

Dr. Rick, the great Danish authority upon the Arctic, has published an interesting work upon the tales and traditions of the Esquimaux, and is of the opinion that they are an indigenous people who have been pushed northward by intrusive Indian tribes. Mr. C. R. Markham, in his recent work on the Arctic, maintains that they entered America from Asia by Behring Straits, being driven in that direction by the pressure northward of hordes from Central Asia. This is not, however, the prevailing opinion among American ethnologists who have studied this question, such as Dr. Davis, Robertson, Dall and

others, who think there is no satisfactory evidence of an Asiatic origin — at least in that direction.

METEOROLOGICAL AND EARTHQUAKE DISTURBANCES.

The winters in Russia are becoming colder and the summers warmer, which is attributed to the great destruction of forests in the southern part of the country. The injurious effects of the extensive destruction of forests is awakening a great deal of attention in Europe, and several works have appeared upon the importance of their preservation. I have frequently before referred to this subject, and to the consequences that will follow in our own country from the reckless way in which our forests are destroyed. The present irreclaimable condition of certain parts of Asia and of Northern Africa, once thickly inhabited, has arisen from this cause. A marked decrease in the volume of European rivers has also been observed, partly through this cause and the melting of glaciers. The waters of the Danube are said to have disappeared some fifteen miles below Donaueschingen. It will be remembered that terrible inundations occurred last June at Toulouse and the country in its vicinity in the south of France, as well as at Buda-Pesth, in Hungary, in both instances attended by an enormous destruction of life and property. The rate of propagation of the waves of inundation in France along the borders of the river Garonne, was found to be two miles an hour, in a run of 140 miles, through the districts where the principal calamity occurred, showing that if a system of signal warnings had been established through a country so exposed as this part of France to inundations, much of the disastrous effects, especially in the loss of life, which has been estimated as high as 3,000 persons, might have been averted. This most destructive inundation in France is attributed to an unusually heavy rainfall, the melting during the previous part of the summer of the snow and ice upon the mountains, and to the large destruction of the forests, the forests previously having had a great effect in equalizing the distribution of water, and in preventing a too rapid melting of the snow and ice whilst the growth of timber upon the hill-sides prevented a too rapid flow of surface-water.

Great attention has been given during the year to the study of the tides and their causes, whether due to the moon, to the sun or to other influences of a meteorological nature. Prof. Hennessy, of Dublin, in opposition to the views of Sir John Herschell, maintains that land has a greater effect in throwing heat into the general atmosphere

and distributing it over the earth than water. The heat, he says, penetrates the water to considerable depths, and being there absorbed the surface of the water never acquires a very elevated temperature, even at the equator. His conclusion is, that of all substances, water is the best adapted for the absorption and distribution of solar heat throughout the external coating of the earth. In this respect he agrees with Mr. Croll in his recent work upon Climate and Time, that it is the distribution of heat by oceanic currents, flowing southward or northward from the equator, like the gulf stream, which is the cause of the mild temperature of certain countries which, but for this cause, would be uninhabitable.

Meteorological disturbances in the form of hurricanes upon land, destructive gales at sea, cyclones, etc., have, during the year, been very extensive and of unusual severity. A hurricane passed over the Philippine Islands, which destroyed more than 4,000 dwellings and by which 240 persons were killed. Another hurricane swept over the Island of St. Vincent, in the West Indies, accompanied by a deluge of rain, unprecedented, even in that part of the globe; the rain coming down in an unbroken sheet of water for twelve hours, and reaching, it is said, the unparalleled amount of nineteen inches. The hurricane was preceded by an intense and oppressive heat, and streams, which the parching heat had left dry, became roaring torrents. Houses were carried away, landslides occurred and a large part of a graveyard, with the bodies interred, was swept into the sea. In the same month (September), one of the most formidable cyclones that has been known upon our coasts for years, occurred at Galveston, Texas, and in its vicinity, during which 174 persons lost their lives, and Indianapolis and other places were covered with the wreck of stores, dwellings and churches.

Storms and rain-falls of unusual violence have also occurred in our Western States, in England, in other parts of Europe and in Persia; and earthquakes have occurred in our own country at Washington and Macon, in Georgia, and in Knoxville, Tennessee. They have occurred also at Cucuta in New Granada, Guadalajara in Mexico, in Algeria, in Barcelona, at Broussa in Asia Minor, at Sanghur in India, and at Ravenna in the Loyalty Islands; and a volcanic eruption, in which the earth was rent to a considerable distance in a number of fissures, occurred in Norway. For some time past in Sweden great attention has been bestowed on the observation of clouds, and the meteorological societies of several nations are now

co-operating with Sweden and sending the result of their observations there for investigation. M. Monchez, who has recently been investigating the subject, has arrived at the conclusion that the movement of air in cyclones is always from below upward, while in whirlwinds the movement is from above downward; that the wind descends from the clouds in the form of a bag, terminating in a point, and that water-spouts have no connection with cyclones but result from a different cause.

VOYAGE OF THE CHALLENGER.

The voyage of the Challenger, to which I have heretofore so frequently referred, has been continued. Soundings were taken for temperature in the middle of the Chinese seas, which at the depth of 1,200 fathoms was found to be 36° Fahrenheit. This temperature is accounted for by a barrier that rises to within 900 fathoms of the surface of the water and cuts it off from the Atlantic. From there the vessel sounded off the western coast of Lucon and made a run of about 2,000 miles parallel with the equator, and thence sailed through the Caroline and the Pedrone Islands to Japan. The greatest depth between the Admiralty Islands to Japan, which is a distance of 2,250 miles, was ascertained to be 4,575 fathoms, or 27,450 feet, the deepest yet found, except the soundings of our own vessel, the *Tuscarora*, off the east coast of Japan, which was to the depth of 4,655 fathoms, but no sample of the bottom was then procured. Thermometers sent down to these great depths were crushed to pieces by the enormous pressure which they had to bear. One, however, withstood the pressure and showed that there was a layer of water of the uniform temperature of 34°.5 Fahrenheit, occupying the bottom of a trough of the ocean of the enormous thickness of 18,450 feet. The Challenger is now on her way back to England, to which she will return this spring after one of the most important scientific voyages ever made by any vessel. Great attention is now paid to the study of physical geography in the colleges and universities of Europe. During the year Baron Richthofen, the Chinese traveler, has been appointed Professor of Geography in the University of Bonn, and Dr. Wagner, editor of the *Almanach de Gotha*, received a like appointment in the University of Königsberg. We should not be behind other nations in view of the great practical importance which this science is now assuming; and it is to be hoped that Columbia College, as it is the principal college in this the chief maritime city of the continent, will establish such a professorship.

EUROPE.

There is comparatively little to state in respect to Europe. I do not know what progress has been made, if any, in the projected measurement of an arc of the meridian from Sweden to Sardinia.

DRAINING THE ZUIDER ZEE.

The project which has been entertained in Holland since 1849, of draining the Zuider Zee by converting it into dry land, which was reported upon favorably in 1873, by the commission to whom the consideration of the project was entrusted, has at last been resolved upon, and the Dutch chamber have granted the necessary funds for the commencement of the work, which I suppose has been begun. No people, ancient or modern, have done so much by artificial means to overcome the difficulties of nature as the people of Holland. Their whole country which lies twelve feet below the level of the sea, and which would be inundated but for the great dyke or sea-wall which they have erected, and constantly maintained is a monument of their energy, foresightedness and perseverance. In 1851 I rode along the Harlem Meer or lake and looking out upon this expanse of water, twelve miles long, seven miles wide, and fourteen feet deep, I saw three hydraulic engines at work pumping out the water, and wondered at the enterprise and perseverance of a people who could engage in such an undertaking. I passed over the same spot the summer before last, and saw the space covered with thriving farms and villages, which I had formerly seen as a great sheet of water, and from inquiries made in Amsterdam, learned that the government had been fully reimbursed for its outlay in the value of the recovered land. But the draining of the Harlem Meer is a small work compared with the gigantic undertaking of the draining of the Zuider Zee, which embraces an area of 759 square miles, 485,775 acres of which would be fertile land. The total area of the Netherlands amounts only to 12,679 square miles, and this will increase it to the extent of nearly six per cent. In the time of the Romans, what is now the Zuider Zee, was a comparatively small lake, the *Lacus Flavo*, or the *Fledo* of the Dutch, which communicated with the Baltic Sea by a narrow channel. In 1282, after one of those catastrophies which has so frequently swallowed up whole districts upon the eastern shores of the German Ocean, the present Zuider Zee began to form by the intrusion of the ocean, and successive disasters continued to enlarge it until 1476. A vast amount of country was

thus submerged, involving the destruction of farms, villages and towns, and the lives of an enormous number of human beings. During these two centuries a productive district of country, of about 1,500 square miles, was entirely covered by the water of the ocean and rendered absolutely useless. But this was not all. The sea thus formed was not even serviceable as a means of communicating with the land by water, as its navigation was exceedingly difficult and dangerous. It is a dull waste of waters, with low marshy borders, in which it is not only difficult to distinguish the shores in certain places, but it is filled with shifting shoals, against which the navigator must be constantly on the watch. It is only Dutch sailors, familiar with it during life, who can at all navigate it, and even to them it is perilous. The effect has been that the once flourishing towns around its borders, which were formerly among the principal commercial ports of the Netherlands, became practically useless for the general purposes of commerce, and their trade and industry having greatly declined, and in some cases having entirely passed away, they have come to be known by the expressive appellation of the dead Dutch cities.

The work of draining this large inland sea will be begun by constructing an immense dyke 164 feet wide at the bottom of the sea, and rising to a height of twenty-six feet above it, which will extend from Enkhuizen, one of those old decayed cities, to the small island of Urk, and from thence it will be continued to Kampen; making a total length of wall near the narrow opening of the sea, of twenty-five statute miles. The enclosed area, shut out from the sea by this great wall, will be divided into squares and the water pumped out, while navigable canals will connect Amsterdam, Hoorn, Edam, and other places with the waters of the Atlantic. The expense of the work will be \$48,000,000 or about \$100 an acre; and as the draining of the Harlem Meer occupied more than ten years, it must be many years before this great undertaking will be finished. Not only have the Dutch drained the Harlem Meer and begun this greater undertaking, but, to overcome the difficulties of the navigation of the Zuider Zee, they first constructed the long ship canal from Amsterdam to the Helder, which, not being found sufficient for its purposes, they have just finished a still greater work, the wide and deep canal from Amsterdam directly to the German ocean; one of the greatest pieces of engineering work, in view of the difficulties overcome, of modern times. Amsterdam whose commerce had for years been declining, has now become as accessible as any of the commercial ports of

Europe; and the effect of this canal upon its prosperity has been most rapid. When I visited Amsterdam in the summer of 1874, I found the quaint, picturesque and stationary old city that I had seen twenty-three years before, so changed into an active, busy, commercial metropolis, that as I moved about its streets, or walked along its canals, I could scarcely realize that I was in the place that had been so strongly imprinted upon my memory.

Mr. Watts ascended the Vatnajökël in Iceland, to a higher point than has heretofore been reached by any traveler, and was to resume his researches over parts of the island yet unexplored, and where exploration is difficult and dangerous. Dr. Faurel, of Lausanne, has been investigating the oscillatory movements of the surface of the lake of Geneva, and which occurs upon other Swiss lakes, the result establishing what was before inferred, that it was due to variations in atmospheric pressure.

ASIA.

PALESTINE.

A great deal has been done during the year in Asia. The total area now surveyed by the British Palestine expedition, is 4,430 square miles, which leaves 1,500 to complete the survey of Western Palestine. A map of the whole country this side of the Jordan will be prepared this year. The American Palestine Exploration Society's expedition has been actively employed during the year east of the Jordan in a reconnoissance of Moab. It has made a skeleton map of Moab and taken one hundred photographs of objects of interest.

ARABIA.

In mentioning in one of my former addresses the military occupation by the Turks of Yeman, that fertile and interesting part of Arabia, I remarked that no good would come to the country from Mohammedan possession and rule. That apprehension has been verified. A recent writer complains of the manner in which the Turks govern this recently annexed territory. Nothing is done, he says, to advance education or improve schools. Various tribes have been driven to revolt through the mal-administration of the government, and during the four years of the Turkish occupation £900,000 has been levied in taxes, not one penny of which has been used to advance or develop the resources of the country. What the Turks are now meditating is to bring the districts of Sade Yam and Mareb under the same unfortunate rule.

SIBERIA.

Mr. Schekanotsky and Müller have given an account of the Olensk expedition in Northern Siberia, to which I have previously referred. They started from Erbokhoger, $61^{\circ} 16'$ north latitude, and proceeded along the valley of the lower Tunguska, but owing to the depth of the snow and the great severity of the cold which was as low as minus 45° centigrade, their progress was very slow. They arrived at the confluence of the Kopokit and Olensk rivers and crossed the massive mountain chain of Anaon, and reaching $66^{\circ} 26' 30''$ north latitude, when they came upon a large stream, the Moniero, and returned after many trials and difficulties by the way of the Olenck river. Their journey was chiefly of a scientific character, having reference to the geological, botanical and meteorological features of the country.

EASTERN RUSSIA.

Dr. E. Tietzi has made a journey through the provinces of Ghelan and Mazanderan, which comprise the northern slopes of the Elburz range, and a flat slip of coast land between it and the Caspian, and found proof that the sea formerly extended to the foot of these mountains, by the examination of rocks, which bear the imprint of the lashing of the waves.

It has been decided by the Russian government that the route of the railroad over Asia should be from Niji Novogorod to Kazan, Ekaterinburg to Tiumen, which I suggested would probably be selected as the best one geographically, to ultimately reach Pekin by the way of the Desert of Gobi. Mr. Polgakow made a journey for the exploration of the region of the upper Volga, and from his observations, came to the conclusion that the upper course of the river must have been joined to the lower and middle course, accidentally.

The expedition which has been long in preparation for the survey of the old bed of the Oxus, left last June to enter upon its work, and Messrs. Solimani and Moshkof have found Lake Aral to be 242 feet above the Caspian, and 157 feet above the Black Sea. The height of the Caspian above the Black Sea was assumed to be 86 feet.

Major H. Wood, who accompanied the Russian expedition, for the examination of the ancient bed of the Oxus, has expressed the opinion that the change in the river, by which its mouth has been diverted from the Aral to the Caspian Sea, was brought about by the obstruction of its waters for the purpose of irrigation, especially in Kivah, and that if the river had not thus been interfered with, it would have continued in its course to the Caspian.

TURKESTAN.

A Russian expedition left Tashkend last April for the exploration of Hissar, or as far as the Oxus. The route of the expedition was through Samarkand, Karshi and Baisum to Hissar, a country but very imperfectly known, our knowledge of which has heretofore been derived solely from ancient writers, for no modern European traveler has ever trodden its soil. The expedition ascertained that the rivers Khuziar, Dargas, and Shirabad were not the magnificent streams they had been represented to be. They found that the Sirshan is an important tributary of the Oxus, the very existence of that river having been doubted by Fedchenko, the late Russian traveler.

They discovered the remains of the remarkable stone bridge over the Sirkab, described by Clavigo, the Spanish ambassador to the court of Timour, in the fifteenth century, but were not able to identify the position of the famous pass of the iron gates, a great natural opening closed by folding gates cased with iron and hung with bells, described by the Chinese Buddhist Missionary, Hwen-Kisang, in the seventh century, and which pass Clavigo described as impregnable, though the gates were not then there. They visited all the towns of any importance, and the result of their expedition will be an accurate map of the territory of Hissar and Kulab, based upon points, determined astronomically.

M. Vambery, whose journey to Turkestan was our principal information respecting it and the cities of Samarkand and Bokhara, prior to the Russian military expedition, has given a very interesting account of a journey from Samarkand to Shehri-Sebz, by the Russians. Shehri-Sebz or the green city of former times, is the birth-place of that great conqueror, Tamerlane or (Timour-Leng), and was, he says, five years ago known to the outer world only through an obscure veil of hearsay and fiction; but now, by the strange changes in history, the birth-place of the famous conqueror of Moscow, who had slain and led into captivity thousands of Muscovites, is, after a lapse of 500 years, conquered by the descendants of those Muscovites and opened to the knowledge of the civilized world. In the autumn of 1874, three Russians, Mr. N. Magef, editor of the *Turkestan Gazette*, M. Krivtsof, a photographer, and M. Bektchuran, made an excursion to Tamerlane's birth-place, which is about thirteen German miles from Samarkand. On reaching the valley of Shehri-Sebz and of the gardens which surround the towns of Kitab and Sherar, they found that this district, which, in the middle ages, was

famed for its fertility, is at the present day not equal in fertility to Khiva. On three sides it is hemmed in by groups of mountains. The town of Kitai, which has a citadel, taken by the Russians, and has a square and a bazar, they found to be now dirty and poverty-stricken. After a rain, the streets are a foot deep in mud, and the whole appearance of the district confirms the accounts of the extraordinary marshiness of this part of Central Asia. They found, however, gardens, meadows and cultivated plots of ground, occurring in unbroken succession, in which fruit was plentiful; and say, that if it were not for the warlike spirit which has distracted this part of Asia so long, the native land of Tamerlane would now be more densely populated than even in his day. They also visited Shehri, the second city of the valley. Here the diplomatic representative of Henry III, of Castile, was entertained at the court of Tamerlane in 1405, and, upon his return, he gave a glowing account of the palace upon which builders and artificers had then been employed for twenty years, and described the high and broad entrance to its gardens, adorned with glazed tiles of different hues, as well as the beautiful galleries and reception halls, adorned with ivory, azure, silver and gold. They found these ruins still very fine and exceedingly interesting. They saw the dome that once crowned the building which can still be recognized, though it has fallen from the walls, which were covered with the remains of inscriptions, elaborate mosaics and other decorations, relics of the power and splendor of that mighty Asiatic conqueror, whose fame, for so many centuries, dazzled the imagination of Europe, and whose deeds furnished the material for the English drama of Marlow, and the French tragedy, associated with his name.

Monsieur Barbeau de Marney, with scientific associates, has been engaged in a geological exploration of the region watered by the *Ama Daria*, and furnished an elaborate account of the result to the Imperial Russian Geographical Society last March. The information supplied is geographical as well as geological, but the details are too numerous to enter upon. He closed his exploration after a journey of 1,400 miles on horseback, at Samarkand, which he declares to be one of the most remarkable places in Central Asia, not only to the archæologist and the historian, but also to the geologist.

CHINA.

Mr. R. A. Margary, who established a high reputation as a geographer and explorer, by his journey from the China Sea to the Ira-

waddy, by the way of Younan-Fu and Momien, started on a journey from Anko, up the Yang-Tse Kiang, for the purpose of meeting the expedition from British Burmah, under Col. Browne and Mr. Ney Elias, an expedition undertaken to establish more extensive commercial relations between Burmah and China. Mr. Margary's route was by boat from Hankow, along the Yang-Tse, to Tung-Ting Lake, and through the lake to the province of Quichow, where navigation ends; and then by land journey over the magnificent passes of that mountainous province to Younan-Fu. But this enterprising explorer was murdered after having reached Younan-Fu, and the journals kept by him probably have not been saved.

Monsieur Du Bernard, a missionary, made a journey in China to the savage tribes of Lissu, who are nominally subject to Chinese rule, but their intercourse with China and Thibet has not changed their savage nature, as they make raids on surrounding tribes and live on these incursions wholly by rapine. He was well received by these savages, though they refused to comply with his mission, which was to induce them to release their prisoners. Gold is abundant in the country and small gold balls are the recognized currency, weighed in Chinese scales. Their religion is purely fetichism.

I have heretofore frequently referred to the Abbé David's exploration in the northern regions of China, in which he has gathered a great deal of geographical information, and his botanical collections and observations as a naturalist have been exceedingly valuable. Among other explorations he reached Moupin, on the frontier of China proper, which, until recently, was not to be found upon the maps, and which is inhabited by a race differing both from the Chinese and the Thibetans, though resembling both. The country forms a part of the Himalaya range, and is covered with lofty mountains, clad with perpetual snow. Among other discoveries of this cold region, where the snow is on the ground for six months in the year, were monkeys in the woods, in large troops, an animal heretofore found only in the warm latitudes in the vicinity of the equator, and which differs from the monkeys with which we are familiar, in the adaptation of its form and covering to its cold northern home. The hand, instead of being long and slender, is large and thick; the arm, instead of being long, is comparatively short and very muscular. The hair, on the older animals, is four inches in length and is of different colors, grey, reddish, black, and yellowish, and the conformation of the head indicates a higher intelligence than that of other monkeys. The

nasal region is deeply depressed, and the opening of the nostrils is very large, with the nose turned up at the point. He also found in the same region other monkeys who hide in caves, like the apes of Algeria or Gibraltar, which were once very numerous, but have been so extensively destroyed for their skins that they are now rarely met with.

Monsieur M. Dupois has made an exploration of the Hong Kiang or Red River of Tong-King, in China. As a means of communication he is of opinion that it will prove of great importance for the purposes of trade, and that the commerce would in a few years attain at least half the magnitude of that of the Yang-Tse, as it would open up communication between the south-west provinces of China and Leos and Thibet, the population of which countries amount to an aggregate of about fifty millions.

Dr. Hermand, a French traveler, has given an interesting account of Tong-King or Tonquin, the country upon the gulf of that name, or that part of Annam which lies between Cochin China, and the great range of mountains that separate it from the southern part of China. Dr. Hermand describes it as a country of great fertility and densely populated. The people are represented by him as a mild and inoffensive race who are greatly burdened, as the country is heavily taxed to make up for the sterility of the rest of Annam. He found the mandarins exceedingly hostile to Europeans, and pictures them as cunning, ignorant, and given to intrigue and exaction. He says that throughout the whole course of administration, from the humblest officer to the highest, nothing can be obtained without a present. There is but little commerce, which is in the hands of the resident Chinese, whose chief occupation is that of money-brokers. The mountains which surround Tong-King are inhabited by a number of savage races of whom comparatively little is known, but are evidently the aborigines of the country. The mountain region to the north-west is infested by banditti, chiefly Chinese, living by plundering the unprotected inhabitants of the plains, who have to keep constant watch along the roads and the approaches to the towns, to preserve what they possess from these mountain marauders. It is the old story of the difficulties that retard the progress of civilization—the struggle between savage and civilized man when in proximity, in which civilized man is the final victor. A French Roman Catholic missionary furnishes a very full account of one of the provinces, Thank-hia, in which there are, in a population of 1,200,000, 15,000 Roman Catho-

lies, a very large proportion of Christians for any part of eastern Asia. The seaport upon the coast, he says, is visited from March to December by shoals of whales, who are not caught or utilized but held in religious veneration by the people. A handsome pagoda is erected upon the coast to their honor, and when a dead one is washed ashore they give him a funeral, interring him with solemn religious rites. If the French missionary has not confounded the enormous blackfish which abounds in these waters with the whale, and there are really whales in such numbers in the Gulf of Tong-King, I apprehend, that when this intelligence reaches Sag Harbor, New London, and New Bedford, our captains will very soon be enlarging their knowledge of the geography of the Gulf of Tong-King, and will greatly shock the religious prejudices of the Annanites by an exhibition of the kind of interest they feel in this sacred object of Annanite worship.

Baron Richthofen, the geologist and Chinese traveler, after a careful examination of the subject, and after fully considering the doubts of the Abbé David, estimates the present population of China at 415,000,000. He considers the government census to be much more reliable now than it was formally, and explains that the census is taken by hanging tablets outside of every house on which the names of all the members are written, whether present or absent, and as there are overseers to every hundred houses the work is simply one of addition.

MONGOLIA.

Capt. I. A. Sosnoski, a Russian, has attempted to make his way from China to the Black Irtysh, in Siberia, but by which route or with what success is not yet known. The sources of the Black Irtysh, which rise in Western Mongolia, were first explored by him in 1872, of which I formerly gave an account. The Irtysh being the western branch of the Obi, and indeed the larger of the two, is a river of which we simply knew that it flowed from Lake Zaisan, on the border line which separates Asiatic Russia from Mongolia, and that a river flowed into the lake from Mongolia in the Altai range, which being in fact a part of the same great river was called the Black Irtysh to distinguish it from the part which unites with the Obi and forms the river that flows into the gulf of Obi, and is one of the great rivers of the world. Of its remote eastern source, in Mongolia, we knew comparatively nothing until it was explored in 1872 by Capt. Sosnoski, the officer now attempting to reach the Black Irtysh by proceeding from Hangkou, in China, to Kulja, in eastern Turkestan, a very

formidable journey across China and Mongolia. The country of the Black Irtysh has also been explored by Mr. Molusooski, a Russian, embracing the Ektag range of the Altai to the country of the Kal-mucks, on one of the most easterly head rivers of the Irtysh, a journey of 514 miles, in which he determined various altitudes in this mountain land and collected a vast amount of information respecting the people, the means of communication and the sources of trade. Mr. Morozof, a Russian merchant, dispatched couriers from Lake Zaisan to Dzungaria and western Mongolia, an extensive journey in which great attention was paid to obtaining geographical information, especially in respect to distances and the most practical routes.

THIBET.

A large lake, Tengrinor, has been found in Great Thibet, by the half Thibetian Indian explorer employed by Major Montgomery in 1872, to investigate the unknown country north of the Thibetian watershed of the upper Brahmaputra. He crossed the great range, the northern boundary of the Brahmaputra valley, in a north-easterly direction, from Shigatze, and went completely round Lake Tengrinor, the existence of which was simply known from old Chinese authors by that name, but which on the spot is called Lake Namcho, or Sky Lake, and returned by way of Lhassa. He found the streams frozen hard, and was struck by the number of hot springs having a sulphurous smell, the water being ejected with great noise and violence like our western geysers. The lake is fifty miles in length, by some sixteen or twenty-five in breadth, and bounded on the south by a range of snowy peaks 150 miles in length, the highest of which is more than 25,000 feet above the sea. Latitudes and observations of heights above the sea were taken. This exploration has elucidated the geography of an area of 12,000 square miles, and one of the northern tributaries of the upper Brahmaputra has been thoroughly explored.

PERSIA.

Captain G. C. Napier has made an adventurous journey in Northern Persia, and found certain parts of it very fertile with heavy crops of cereals. At Shkoh he saw some seams of good coal that can be worked from the surface, but the people were ignorant of its use. He visited Kelat, crossing the main chain of the Elburz mountains, a mass of hard, grey limestone rising with jagged teeth to about the height of 7,000 feet, and paid much attention to the system of irriga-

tion so essential in Persia. He passed several villages on the road to Deregez, inhabited by a fine race very different from the majority of Persians. They were well clothed, ruddy men, who had terraced gardens, well stocked orchards, and fields of waving grain, the most prosperous Persians he had seen. He found valleys, the produce of which would feed whole districts, uninhabited for the reason that they were the neutral grounds between the plundering Turkomans and Kurds. One town, Joh Jarm, that in the time of Nadir Shah had 5,000 families, has now but 400, which is attributed to the devastation of the Turkoman who destroyed the works for irrigation. At Ashrof he found the famous garden of Shah Abbas wholly neglected, the buildings, fountains and stone terraces being all in ruins. Orange and citron trees were growing in wild abundance, their fruit being left to fall and literally cover the ground. Though under the present state of things Ashrof is of little note, it must, he says, be one day the center of one of the most important districts of Persia. Sir Henry Rawlinson, a most competent authority, refers in the highest terms to the labors of Capt. Napier, and says, that when his discoveries are properly worked out they will throw great light on this part of Central Asia.

The Hamburg Geographical Society have organized an expedition for the exploration of Persia, under the direction of Dr. Andreas, an Oriental scholar, thoroughly qualified for the work. The country to be explored is bounded on the north by the road connecting Bushire, Shiraz and Kirman.

INDIA.

Mr. Bond of the Indian Trigonometrical Survey, discovered two of the wild dwarfish race, who live in the hill jungles of the Western Gâlitz, to the south west of the Palini Hills, a race which, though often heard of, no trace of had previously been found by the survey. A man and a woman were discovered. The man was four feet six inches high, and twenty-six and a quarter inches about the chest. He had a round head with coarse, black woolly hair and dark brown skin, a forehead low and slightly retreating, the lower part of the face projecting like that of a monkey, with thick lips, protruding about an inch beyond his nose; a comparatively long body for his size, with short bandy legs, and arms extending almost to his knees. The hands and fingers were so contracted that they could not be made to stretch out straight and flat. The palms and fingers were covered with a thick skin, particularly the tips of the fingers, the nails being

small and imperfect, and the feet broad and thick-skinned all over. He had a grayish-white, scanty, coarse mustache like bristle, but no beard. The woman, who was about of the same size, was of a yellow tint, with long, black, straight hair, and features well formed as contrasted with that of the man, there being no difference between her appearance and that of the common women of that part of the country. She had an agreeable expression, was well developed and modest. Their simple dress was a loose cloth, and though they ate flesh, they lived chiefly on roots and honey. They have no fixed dwelling-places, but sleep between rocks or in caves, near which they happen to be at night, when they light a fire and cook what they have collected during the day, maintaining the fire during the night for warmth and to keep off wild animals. Their religion, such as they have, is the worship of certain local divinities of the forest. This is a new pigmy race, resembling the African Obongos of DuChaillu, the Akkas of Schweinfurth and the Dokos of Dr. Krapf in their size, appearance and habits.

Col. Montgomery gave before the British Association a very interesting account of the gigantic glacier system of the Himalaya range, which, he says, reaches its greatest development in Baltistan in North Western India. The glaciers increase in size from east to west, and are in many instances more than twenty miles in length, the largest, Biacho, being thirty-four miles long. The thickness of the ice was, in some cases, 400 feet, and the experiments made show that the phenomena of motion was the same as in the Alps.

AFRICA.

CAMERON'S EXPEDITION.

The chief geographical events of the year, in Africa, have been the exploration of the Victoria N'yanza by Stanley, and the journey across that continent by Lieut. Cameron, from Lake Tanganyika to Benguela on the western coast, about $11^{\circ} 56'$ south latitude. As Mr. Stanley's journey and its results were fully detailed at our late Stanley meeting, I need not again refer to it. In my last address I gave an account of Lieut. Cameron's exploration of Lake Tanganyika, and of his discovery of its outlet, the river Lukuga, on the western side of the lake. It will be remembered that I mentioned that he had, in May, 1874, with very inadequate means, started westward to discover the source of the Congo, and to follow that river to the sea, and that if, in view of his limited means and the great difficulty of such an

undertaking, he should succeed, it would be one of the most remarkable achievements in the history of the exploration of Africa.

He started in May, 1874, and had not been heard from until the twenty-seventh of last November, when a telegram was received from him at Loando, announcing that he had, with fifty-seven followers, come out at Benguela, $10^{\circ} 40'$ south latitude on the west coast; that they were all well; that he had been forced by adverse circumstances, to abandon the Congo route, and had, in consequence, followed the water beds between the Congo and the Zambesi. Since that time two letters have been received from him, with an instalment of his maps and scientific observations, which show that although he did not accomplish the main object he had in view, yet that what he did is of great geographical value. His achievement is a remarkable one, for he has traveled, on foot, from Zanzibar to Benguela, a distance of nearly 3,000 miles; 1,200 miles of the journey being through a country of which nothing has hitherto been known, except some vague Portuguese accounts of parts of it. In 1853, an Arab commercial caravan, trading for ivory and slaves, started from Zanzibar and crossing Lake Tanganyika, traveled westward to Benguela on the west coast, in $12^{\circ} 15'$ south latitude, accomplishing the journey in six months, a knowledge of which led to Burton and Speke's expedition in 1857, in which they reached Lake Tanganyika, and Speke, upon the return journey, discovered the Victoria N'yanza. The route of Cameron appears to have been in the same general direction as this Arab caravan, though he came out upon the coast about a degree or so farther to the north, and had he had at his command the resources of such a caravan, or been provided for like Stanley, he would, in all probability, have found the sources of the Congo and pursued that river to the sea. He did not follow the outlet of Lake Tanganyika, the Lakuga, but went directly north north-east to Nyangwa on the river Lualaba, the farthest point reached by Livingstone, and apparently by the same route. I understand him, however, to say that the outlet of Lake Tanganyika flows into the Lualaba above the junction of that river with two other rivers. He does not appear to have ascertained the fact himself, but from the way in which he makes the statement he is evidently satisfied as to its correctness.

At Nyangwa he tried in vain to get canoes to explore the Lualaba, which, instead of running north beyond Nyangwa as Livingstone supposed, turns to the westward, and, as Cameron heard by report,

then runs to the south-west. He also attempted to cross by land to a large lake, Sankorra, into which, he was informed, the Lualaba flows, and where he was told traders, wearing pantaloons, came in large sailing vessels to purchase palm oil and gold dust, but the chief ruling the country west of the river Lomâmi would not permit him to go in that direction. He also found that Nyangwa, on the Lualaba, was 1,400 feet above the level of the sea, or 500 feet below the level of Gondokora on the Nile, and about 900 feet below the level of Lake Mwutan (Albert N'yanza), which shows conclusively that Lake Tanganyika is not connected with Lake Mwutan or the Nile system as was supposed to be the fact by Livingstone, Burton and Cooley in opposition to the views of other geographers. Cameron also conversed at Nyangwa with Arab traders who had been far to the north-east from that point to Ulegga, which I suppose to be the Balega country mentioned by Livingstone, but they heard nothing of Lake Mwutan in that direction, though one of them knew of the existence of that lake, which adds additional confirmation to the conclusion that there is no connection between Tanganyika and the Mwutan, and led Cameron to believe that the Mwutan is by no means as large a lake as it was supposed to be by Sir Samuel Baker, an opinion confirmed by Col. Gordon's inquiries upon his recent expedition up the Nile in the direction of that lake, to which I shall hereafter refer. Foiled in his attempts to follow the Lualaba in its course, or to get westward on a parallel with the Congo, Cameron made his way along the valley of the Lomâmi in a south-westerly direction to the coast by a route which I find it difficult to trace as the names of the rivers, lakes and places given by him are new to me. He describes the interior through which he traveled, as, to use his own language, "generally a magnificent and healthy country of unspeakable richness." He declares its water system to be one of the greatest in the world, and thinks that a company with a capital of ten millions to begin with, could open up this part of Africa in three years; that the diplomatic difficulties would be greater than the physical ones. He found the head waters of the Zambesi, which he places in 23° E. long., at 11° 15' S. lat., flowing to the south, and says that a canal across the flat level country there would connect the Zambesi with the Congo, but does not appear to have taken into account the cataracts which obstruct the navigation of both the Congo and the Zambesi. Indeed, cataracts have been the chief difficulty in all the great African rivers, for had these rivers been navigable, like the large rivers in

other continents, the regions watered by them would, long ere this, have been peopled by civilized man.

In an independent lake, Mohrya, he found lake villages, which from his reference, I infer to be like the pre-historic lake villages, the remains of which have been recently found in Switzerland and other parts of Europe, or the lacustrine villages now existing in New Guinea. He also met upon his way that curse of Africa—a slave-trader, whom he describes as an unmitigated ruffian, with a string of about fifty wretched women whom he had collected in the villages.

In one of the letters he incidentally refers to the interest felt throughout England, in a work to which, he says, he hopes to devote his life, a passage which has something in it more than mere words, for it recalls the noble body of men, from Mungo Park to Livingstone, who have lost their lives in attempting to open up this great continent to the knowledge of mankind.

WEST AFRICA.

We have now a full account of the result of the expedition to which I have heretofore referred, of the Marquis de Compiègne and Monsieur Marche to the Ogowa river in Central Africa; but little was comparatively accomplished from a combination of unfortunate circumstances, such as the extraordinary lowness of the streams, the hostility of the natives and the ill-health of the explorers. The result of the exploration, however, proved that a properly equipped party may penetrate by this route a considerable distance into the heart of Africa. The German West African expedition, which has been in existence since 1873, has met with innumerable difficulties. Dr. Güsfeldt explored the river Loango up to the falls, but could not get his parties to go any further, as they believed the people of the interior to be cannibals. He afterwards ascended the Niango river to the narrows of Mungo-Niango, in the Balomba country, and then ascended the plateau inhabited by the Baaka.

The Doctor has returned to Europe, and in a recent address before the Berlin Geographical Society expressed the opinion that the obstacles to a scientific exploration of Central Africa upon the south-western coast are insurmountable. There is not only the difficulty of obtaining porters, but innumerable small territories have to be passed, the chiefs of which hinder the advance of Europeans. Astronomical observations could only be carried on in secret, or the

observers would have been murdered by the superstitious natives as magicians.

Mr. A. Watson is an earnest advocate of a central African railroad from Liberia, which would be about 4,000 miles, through a densely populated region. He thinks it practicable from the nature of the country, that it would be remunerative ultimately and would, in his opinion, do more for the civilization of Africa than anything else. I merely state this project, however, as there are numerous difficulties to be considered. Something more must be known respecting the country before such a project can assume any practical shape.

Dr. Menks penetrated to the Okando country, 12° E. longitude, where, among other tribes, he came among some of Mr. DuChailu's dwarf Obongos. After examining the Ogoowai, he is of opinion that it will prove a good highway for inland exploration, and when last heard from he intended to ascend the river eastward as far as possible, and then find his way to the northward.

A French expedition under Messrs. Biazza and Marche has been organized for the exploration of the Gaboon and central tropical Africa, which is to continue for several years. When last heard from the expedition had arrived at St. Louis, on the western coast, had organized their party and started for the Gaboon.

Major Burton has furnished a very interesting account of a former factotum of his in Africa—Selim Aga, an African of semi-semitic Abyssinian blood, who was taken to Scotland at ten years of age, where he learned to speak English, or rather, as Major Burton says, lowland Scotch, and whose fate it was afterwards to wander far and wide over the world, in Europe, Asia, Africa and South America, ever pining for a small cottage in Scotland. Major Burton accompanies his communication with an account written by Selim Aga of a journey made by him up the Congo in 1860, giving a detailed account of what he saw in the different places visited, which is of value now that attention has been especially directed to the exploration of that river, and its supposed connection with the great water system traced in part by Dr. Livingstone. Selim's account is exceedingly well written, but my time would not admit of giving any details of it. I will refer only to one passage. He says he often wondered where all the old clothes go to after they are purchased by the Jews in London, and that the mystery was solved when he went up the Congo, where he saw chiefs and native kings decked out in second-hand livery, adorned with the crests and coronets of noblemen on the buttons, and

other chiefs in old livery coats and marine jackets of the last century. Garments turned inside out, threadbare and glazed by long service, were showily displayed, the African's innate love of finery rendering him indifferent to the defects. This recalls that Lander, in his exploration of the Niger, saw a native proudly strutting about with the cover of a tin can fixed in his head-dress, with the words upon it "concentrated gravy."

The project of an engineer, Mr. Donald McKenzie, has been under consideration in England, to cut a sand-bar that obstructs the mouth of the river Belta, a river on the north-west coast of Africa, near the Canary Islands, which bar, it is supposed, prevents the water of the Atlantic from flowing into the interior of Africa in that quarter. It is assumed that there is a vast depression in that part of the Desert of Sahara, extending from the southern slope of the Atlas mountains on the north, to very near Timbuctoo on the south, and from the high lands of Maghter and Adary, near the Atlantic, to the table lands of Mourzuk and Asben to the east; which depression is supposed to be many feet below the level of the sea and probably the bed of an ancient sea, that dried up when the waters of the Atlantic were cut off by the formation of the sand bar across the mouth of the Belta. An expedition was to leave last September to explore this part of the African coast, and examine the mouth of the Belta; but from recent intelligence the expedition, it appears, has not only been deferred until next spring; but its objective point is to be Cape Mogador, and the exploration of a route from there to Timbuctoo through what is represented by Mr. McKenzie to be a healthy and well-watered country.

The supposition of the existence of a great depression in this part of the Desert of Sahara, is altogether conjectural, there being nothing, so far as I know, in the account of travelers who have crossed the Sahara to Timbuctoo, or in other directions to warrant the assumption of a great depression below the level of the Atlantic; but as a depression has been found in other parts of Africa, there is of course no objection to an investigation. The projectors, however, speak of its existence with great confidence and may have information with which I am not familiar. If it should prove to be true, and this great region can be flooded with the waters of the Atlantic by simply cutting through the bar, at the mouth of the Belta, it would have more to recommend it than the proposition of M. de Lesseps to flood the Libian Desert by letting in the waters of the Mediterranean near

Tripoli. Goods are now brought to Timbuctoo over 1,700 miles of desert, and take four months in their transit. If Mr McKenzie's project should be realized, a journey from London to Timbuctoo might be made in two weeks. Prof. Hennessy, in opposition to the views of others, says that if it were possible to flood the African desert, it would have no injurious effect upon the climate of Europe and would greatly benefit that of western Africa.

SOUTH AFRICA.

Mr. Mohr, who was accompanied by Dr. Hübner, the geologist, has, during the year, given an account of his journey through southern Africa, in which he carefully determined the geographical position of various places from the coast to the Victoria Falls on the Zambesi, and Dr. Hübner has added an interesting account of the South African diamond fields.

Mr. St. Vincent Erskine, of whose exploration of the Limpopo river I previously gave an account, has furnished the Royal Geographical Society with an account of his journey to Umzila in South Africa. The country he traversed was not particularly interesting, though the vegetation in some places was remarkable. At the borders of Umzila at the Injantombe river, latitude $23^{\circ} 35'$, he saw a giant creeper which not only covered the tops of the trees like an umbrella but was also supported by poles until it covered 5,400 square feet. The country about King George's river, which has several affluents that rise at about an altitude of 6,000 feet, he describes as one of the healthiest and finest countries in the world, but the lands near the coast, drained by these rivers, are too unhealthy for Europeans. He descended the Limpopo and found it abounding in fish, but very shallow. He was three days going down to the sea and found the river which flows through a fine alluvial valley navigable for only about sixty miles, and difficult of entry. Fever, he says, prevails all along the coast beyond, 27° latitude, but does not extend beyond the foot of the hills, which run generally near the sea, and the vast plateau above, he says is as healthy as the Island of Madeira. He describes the Zulu country or coast as having a high ridge near the sea, with hills rising gradually northward to the Zambesi. The maps of the coast were found to be exceedingly erroneous, containing many mythical mountains and streams. In the course of his journey he came to a peculiar race, living in bark huts and of filthy habits, who wore tails or stumps sticking out behind made of leather ornamented with brass,

which he supposes to have been the origin of the reports which have so long prevailed that there were races or people in Africa with tails, or a kind of human monkey. The report of the men with tails is not yet, however, exhausted. Mr. Ney Elias of the Burmah expedition met an Englishman in Burmah, in the beginning of the year, who had long been traveling in out-of-the-way places in the world, who assured him that he saw, when he was engaged in looking for orchids, on the east coast of Borneo, some very low looking people who had tails about the size of the middle finger, apparently stiff and immovable. He said that these people were not quite black, though of a very low type, like the aborigines he had seen in the northern part of Luzen. He says that the men went naked, but the women wore a slight bark covering, and that upon landing upon another place, on the next day, he found people without tails. Mr. Ney Elias says his informant was a man of a very slight education, who had never heard of men with tails before, and was very much struck when Mr. Elias told him of what had been published in respect to the tailed men. Mr. Erskine found the huts of these dwarfish people, with artificial tails so filthy that he passed the night under a Boabab tree. This tree, or as it is sometimes called the monkey bread tree, is among the largest trees in the world. It is not as high as some other trees, but is frequently found seventy feet in circumference, and in some instances has been found to measure 112 feet. Our California trees are, however, much larger. Mr. J. T. Gardner, our general secretary, measured one that was 142 feet in circumference. Mr. Erskine gives a touching description of the little slave children in the country of the Umgonis, waiting to be sold. We saw, he says, three or four poor little Kaffirs and a lot of dogs lying in the ashes, an undistinguishable mass of flesh, or rather of bones. They give these poor creatures no food. If there are any pot scrapings, they get them, if not they have only such rats and birds as they can catch. He made an excursion to the Tonga mountains, and heard various rumors of ruins, but when additional inquiries were made the narrators were silent. The country, on the whole, is full of interest, and by its exploration a knowledge will be obtained of a vast and healthy region, closely adjoining the port of Soffala. He went upon another expedition well equipped with hunters, bearers and proper instruments, from which I understood he has just returned.

EAST AFRICA.

The Rev. Charles New, of whose labors in Eastern Africa I gave some account at our late Stanley meeting, made a journey from the river Pangani through Usumbara, onward by the way of Wasegeju and Wadigo to Mombassa. He found the Wasequa to be a numerous, interesting and well-to-do people, engaged in both pastoral and agricultural pursuits. They occupy the district lying between the coast tribes and the Wasagara and the Wanugi. Vugu, the residence of the king and chief town of Usumbara, is built upon the top of a rounded peak 4,700 feet above the level of the sea, the view from which he described as magnificent. Valleys, he says, drop down to great depths on each side of it, and it can only be reached by the steepest acclivities. There are mountain peaks rising one above another until they are lost in the clouds, presenting every variety of shapes; enormous valleys, gloomy ravines and romantic looking glens, dark majestic forests, expanses of tall, waving grass, beautiful slopes, and everywhere patches of cultivated land, with brook streams, and torrents which trickle, murmur, tumble or splash on all sides. The soil of Usumbara is very fertile, rains are frequent and the country never suffers from drought. Almost every thing can be raised and the whole country is declared to be a sanatorium for the future residents of Africa. I am sorry to add that news has been received in London of the death of this highly intelligent and energetic missionary. He was, it will be remembered, the first to ascend to the snow limit of Kilimanjara, and to his researches in this and other journeys, we are indebted for the knowledge of a large and fertile region in this part of Eastern Africa, which is not only very healthy but peopled by a tractable race, and abounding in grand and beautiful scenery. The veteran missionary, Mr. Wakefield, the co-laborer of Dr. Krapff, is still at his post at Mombas on the east coast.

A. Raffray, a French traveler, has been engaged in making extensive explorations in Southern Abyssinia and the Eastern Coast of Africa, the details of which are too extensive to enter upon. He has been more successful than most explorers in that country, and says that the Gallas occupying the portion through which he traveled, believe in sorcery, but have no religion. An Italian exploring expedition to East Equatorial Africa was to start last month for Ankebar, to penetrate from there through the Galla country in a south-west direction, towards the Victoria N'yanza. Bishop Stear, accompanied by Shuma and Suzi, Livingstone's two faithful servants, has left

Zanzibar with the hope of being able to establish a missionary station on the north-eastern shores of Lake N'yassa, and Mr. E. D. Young left England last May for the purpose of founding a similar mission on the southern shores of that lake, the friends of Dr. Livingstone in Scotland, having subscribed the large sum of £12,000, for the endowment there of a memorial station to be named after the brave old explorer, from whence it is hoped that Christianity and civilization will be diffused through the valleys of the Zambesi and its affluents, thus practically following up what Livingstone worked and hoped for in his many journeys. When last heard from this expedition had reached the lake, having brought with them a small steamer with which they were navigating it. Col. Long was dispatched by the Khedive of Egypt with a military expedition to explore the river Juba and the imperfectly known country through which it flows. When heard from, last November, Col. Long was encamped two and a-half miles from the mouth of the Juba and eleven miles south of the equator. He writes that the mouth of the Juba is wild and stormy, as the waters of the sea and the river meet there in angry conflict. He explored the river for 150 miles finding it deep, rapid and filled with crocodiles. The vegetation was luxuriant; monkeys abounded along its banks, and as he ascended he saw crowds of ugly naked women and occasionally beautiful Abyssinian girls. He is to be succeeded by Col. Gordon who was then *en route* to open a road to the eastern coast and to establish some form of government there, it being evidently the design of the Khedive to extend the dominion of Egypt over this part of Africa and possibly over the whole of Abyssinia. We learn with great regret that our corresponding member Munzinger Bey, a Swiss by birth and one of the best informed men in respect to Abyssinia, was murdered during this expedition, but under what circumstances we have not learned.

NORTH-EAST AFRICA.

Dr. Nachtigal has given some additional information in respect to Wadai, one of the regions traversed in his great journey, of which I have previously given an account. He fixes the population of the country at about two and a-half millions, and says that the surface elevation of the land is from west to east with an elevation of from 1,000 to 1,500 feet above the sea level. Numerous small streams flow from the eastern heights falling into the two principal rivers, the Kafa and Peaka. The country is divided into seven provinces;

the religion is Mohammedan and the king, whose power is arbitrary, is looked upon as a sort of divinity. The king's harem consists of about 500 wives, and all his sons, except the heir to the throne, are blinded with hot irons, a duty performed by the king of the smiths who is also the surgeon of the harem. The people are skillful workers in iron but given to the drinking of an intoxicating beer, a practice which great efforts are made to repress. Spies are extensively employed for that purpose, and any man upon whose premises the forbidden liquor is found is punished by having his wife's head shaved. The king has an army of 40,000 infantry and 6,000 cavalry and the country is heavily taxed for the support of the king and his expensive government.

Dr. Nachtigal read, during the summer, a very interesting paper upon his expedition from Lake Tschad to the upper Nile. This great African lake covers an area of 10,500 square miles and is in the form of an irregular triangle. Two-thirds of the interior of the lake, he says, is occupied by land, on the central islands of which live several tribes. He considers that the waters of this great lake are not wholly due to the rain-falls or to the neighboring streams, but that a great part of them come from a long distance, and it is a curious fact that there is no outlet to so great a lake. He gave many interesting details in respect to the natives, and urged the utility of repeated expeditions to this part of Africa, to open up the way alike to a peaceful and profitable commerce, and the enlightenment of an interesting and energetic people.

COL. GORDON'S NILE EXPEDITION.

One of the objects aimed at in Col. Gordon's military expedition, between Gondokora and the Victoria N'yanza, was to trace the Bahr el Gebel, or White Nile, to its supposed outlet in Lake Mwutan (Albert N'yanza), and then, by means of a vessel which had been carried up in sections, to explore the lake and settle the question whether it has any connection with Lake Tanganyika, the Lualaba, or the great water system south of it. To do in fact what Mr. Stanley contemplated doing, with his little vessel the *Albert*, when he had finished the exploration of the entire coast line of the Victoria. Col. Gordon had not, when last heard from, succeeded in reaching Lake Mwutan, the disturbed condition of the country, and the murder of the interesting young officer, Col. Bellefonte, the bearer of Stanley dispatches, requiring the colonel's services and that of the armed

force under him in another direction. The native information he received respecting the Mwutan, both with regard to its magnitude and as to its direction, is very different from the impression of Sir Samuel Baker. It is that, instead of running north and south, as it is represented on Sir Samuel's map, its principal extent is east and west, and that it does not extend as far south as the equator. We should now probably have known all about this lake but for the illness of the officers especially charged with this branch of the expedition, and from the disturbed condition of the country, which may interfere with Stanley's plans as it has done with Col. Gordon's. If the colonel has, as is probable, a sufficient military force to overcome the natives occupying the imperfectly known country between the Victoria and the Mwutan, the exploration of the latter lake would no doubt be undertaken either by himself or by Stanley. Colonel Gordon's expedition has, however, resulted in a more accurate knowledge of the country west of the White Nile above Gondokora. Mr. T. Kemp, of the expedition, who was chiefly charged with the conveyance of the sections of two vessels for the navigation of the Mwutan, has made an interesting geographical report of the country lying between Regaf and Dufli, from which latter place it was supposed the White Nile would be navigable to its supposed outlet from Lake Mwutan. They appear by the report to have got as far as Dufli, up to which point the bed of the Nile was very rocky, with steep banks covered with large rocks. Great difficulty was experienced in conveying the boats above the cataract, as the natives would give no assistance. They succeeded, however, in getting beyond the cataracts, and were at Dufli putting the sections of two boats together, when the further operations of the expedition was interrupted as before stated. Lieutenant Chittendale has given an account of the explorations made in the journey beyond the cataracts of the Upper Nile towards Lake Mwutan, which is important, as he received confirmatory information from a chief, whose territory extended from Lake Mwutan, that the river above consisted of two branches, one of which came from Lake Mwutan, by which it was always possible to enter the lake. Lieutenant Chittendale thought that there was probably a large island at the entrance of it, which would account for two rivers flowing from it. This information is of great interest, as it is all that has been received since Sir Samuel Baker's discovery of the lake.

Sir Bartle Frere, in a letter to the President of the Royal Geo-

graphical Society, speaks in the highest terms of Col. Gordon, and of what he has accomplished. Sir Bartle says that every one states to him that Gordon has really checked the slave trade, and still more, the slave hunting, and that the expedition will pay for itself through the Colonel's economy and judicious management of the conquered districts.

Col. Gordon had been joined by Herr Marno of the Vienna Geographical Society, an experienced African traveler, whose object was to explore the west and east ends of the Mwutan, as he considers it not improbable that the lake may have another outlet at the south-west angle. Two outlets of a lake is rather an exceptionable thing in geography, but it may well occur in Africa, where the lakes, especially the more shallow ones, are greatly swollen in the rainy season, and the water rapidly accumulating, may find an outlet at a higher elevation and in another direction from the one through which it flows when the lake is at a low level. Herr Marno made an exploration about 150 miles south-west of Lado, and came within sight of the mountain which Dr. Schweinfurth had seen to the eastward in his journey to the country of the Nyam Nyam. Herr Marno when at Ghab Shambil on the Bahr el Gebel, in about 7° north latitude, saw a female of the Akkas, the dwarf or pigmy nation that dwell south-west of the farthest point reached in the Nyam Nyam country by Dr. Schweinfurth. A male of this extraordinary diminutive race, Dr. Schweinfurth brought with him upon his return journey, but the Akka died just before reaching the Nile, and another was brought to Italy by the late Signor Miani, but this is the first female, at least of the Akkas, that has been seen. Herr Marno believes that Dr. Krapf's Dokos, Mr. DuChaillu's Obongos and Dr. Schweinfurth's Akka, are the same race, and are the aborigines of Central Africa. DuChaillu's Obongos have, as I have said, been seen by another African traveler, Dr. Menks, during the present year, and Mr. DuChaillu's account of them fully confirmed. Herr Marno was invited by Hassam Ibrahim to go into the Nyam Nyam country as far as the home of the Akkas, and probably intended to do so by proceeding westward after exploring Lake Mwutan, but from intelligence recently received he appears to have returned down the Nile. Col. Gordon has made Lado the station on this part of the river instead of Gondokoro, with which we have been so long familiar. Gondokoro was built upon an eminence about twenty-five feet above the Nile, which flowed at the bottom of the bank. The

river, however, afterwards changed its course, leaving what was formerly its bed in front of Gondokoro a stagnant and fever-breeding marsh, and it is the present unhealthiness of Gondokoro which has led to the selection of Lado, a few miles farther down the river.

NORTH AFRICA.

Col. R. L. Playfair has given an account of the exploration of the Aurès Mountains, a comparatively unexplored region in North Africa, the natives of which, he says, are clearly of European descent, many Latin words being still used by them. They live in stone houses, and Roman remains are met with in all directions, indicating a high state of civilization when the Romans occupied the country. There was a great extent of cedar forests and lead was to be found in abundance. The women, he says, are of singular beauty, and, unlike other Mohammedan women in North Africa, never conceal their faces.

A French expedition has been fitted out by the Chamber of Commerce under Mr. Largeau, to go from Algiers to Rhadames, with a view of opening up a communication and trade between the Soudan and Timbuctoo. Mr. Largeau departed last March for Rhadames or Ghadamez, as it is sometimes spelled, an oasis in the central part of Sahara, and Mr. P. Soleillet, who had previously explored part of the Sahara, has undertaken a journey to Tusalah, the principal city of the Touaregs. More than 10,000 French have emigrated to Algiers from Alsace and Lorraine, and the European population there is increasing not only by emigration but by the excess of births over deaths.

An Italian expedition, under the Marquis Antinori, went to Tunis to examine the Roman monuments in that country and also to survey the Isthmus of Gabes in connection with the project of introducing an inland sea from the Mediterranean into the Sahara. Capt. Roudaire who had been directed by the French government to make a survey to test the practicability of this project reported that the problem could not be solved until the depth of the portion about Tunis was ascertained and the Isthmus of Gabes thoroughly investigated. This has now been done. A report was made last June to the Italian Geographical Society of the result of the survey by the Italian expedition. The report was to the effect that the country had been minutely observed, that the proper levels had been taken and the conclusion arrived at was that the project of M. de Lesseps of connecting the Mediterranean with this part of Africa by canal was impossible.

The Egyptian Geographical Society under the presidency of Dr.

G. Schweinfurth, the distinguished African explorer, was established this year at Cairo, through the liberality of the Khedive, consisting of 300 members with an annual income of \$7,000. A substantial portion of this income is granted by the government in view of the advantages to the nation of the labors of the Geographical Society, as is the case with several of the leading geographical societies of Europe. But it would be hard to convince our government of the utility of aiding, by pecuniary means, our Society, the only one in this country, when it would not even incur the expense of sending a commissioner to the late great Geographical Congress at Paris, and to our shame we were the only civilized nation that was unrepresented in the exposition. It is not complimentary to our intelligence and our cosmopolitan relations to the world, of which we form so important a part, that we have a government that takes no interest in the advance of civilization and of the trade, commerce and industry of the world at large, through geographical exploration and discovery, the means by which it has been chiefly advanced from the dawn of civilization to the present time. It was not the fault of this Society that our country was not represented in the exposition for earnest efforts were made by us as well as by the French minister, but were met by the reply that the congress in Paris was the affair of a private society, which was not the view taken by the other civilized nations who made liberal grants of money for the success of an undertaking in which the whole world was interested. With our limited means all that we could do was to send a delegation, as nothing could be received for exhibition except under the charge of a commissioner of the government of the country from which it was sent. If the gentlemen charged with the administration of our government had read the frequent expressions of surprise that I have read in the various accounts written of the exposition, at the absence of any representation from the United States, they would not, I think, be very much impressed with the wisdom and policy of the exceptional position in which they placed our country and people. This was not a case in which we could afford to be indifferent as we do not constitute the whole world.

AUSTRALASIA.

Mr. John Forrest, with a party, made a journey across the western interior of Australia, from Murchison river to Peak telegraph station, which was accomplished after terrible hardships from the want of water and the barren state of the country. The journey, which occu-

ped six months, was little else than a continued exploration of sand hills covered scantily with the spinifex grass, with very little water, showing that no settlement will probably ever extend in that direction. The region is occupied by savages who were numerous in certain parts where game exists. This was the first journey made through that part of the Australian continent. Sir George Bowen, Governor of Queensland, who was present at the reading of Mr. Forrest's paper before the Royal Geographical Society, gave an interesting account of the progress in Queensland. He said that it was at first declared to be too hot for sheep, and yet now there were 11,000,000 of sheep in the colony. That the flow of pastoral occupation had gone on like the flow of the tide; each year some 200 miles were added to the domain of civilization, and in the course of five or six years pastoral occupation had spread over the whole of a territory which is three times the size of the French empire. Such, he said, were the triumphs of peaceful progress. Indeed, the progress and settlement of Australia is one of the marvels of our time.

Mr. Lewis has explored the country between $25^{\circ} 35'$ and $18^{\circ} 35'$ S. lat., and $135^{\circ} 50'$ and $139^{\circ} 30'$ E. long., and Mr. Ernest Giles has been exploring the country north of Fowler's Bay.

N. P. Pelletier, who, when twelve years of age was left by some shipwrecked sailors on Night Island, off the north-east corner of Queensland, lived for seventeen years there among the savages, and became identified with them in every respect. He has gradually recovered the use of his mother tongue, though he still retains marked characteristics of savage life. He has given much information regarding these savages, whose language seems to have nothing in connection with the Malayan or Papuan dialects.

NEW GUINEA.

I have frequently referred to the long-continued researches in Papua and the adjoining islands, of Beccari the Italian naturalist and traveller. When I last referred to him he was at Kendari exploring a nearly untrodden corner of Celebes. The coast of the island is dangerous on account of the pirates that infest it, who are cruel and formidable, and it is therefore almost without inhabitants. The fear of falling into their hands caused him to abandon all researches in that vicinity, and when last heard from he was exploring the islands and coasts of north-western New Guinea. He had explored Geelvink Bay, had rectified its coast line as delineated on the best maps and

found that it is not so deep as represented on the maps. He has also discovered a river running from east to west for 215 miles from the Arfak Mountains to the east coast of Galewo Straits, and which drains the north-western peninsula of New Guinea. A large river has also been discovered on the north-east coast of New Guinea. It was ascended by Messrs. McFarland and Stone in the London missionary steamer, the *Ellangowan*, for sixty miles, but is believed to be navigable for 100 miles. It has been called Baxter river. M. Maclay fitted out the vessel at his own expense for the exploration also of this part of New Guinea. He ascended the Baxter, which, he says, is a magnificent river, but the expedition came suddenly to an end from a disagreement between him and the captain of the vessel. As the *Ellangowan* ascended the river in the first expedition, the explorers shot at a wonderful bird of so large a size that the flapping of its wings made a noise resembling the sound of a locomotive pulling a heavy train. They were told by the natives that this ærial monster could fly away with a kangaroo or a turtle, the existence of which bird is confirmed, having been afterwards seen by M. Maclay.

Baxter river has been named after Miss Baxter, of Dundee, who gave the steamer *Ellangowan* to the London Missionary Society for the exploration of the south coast of New Guinea. To the liberality of this maiden lady, the world will be indebted for an extensive exploration of this island, which, as far as can be ascertained, is one of extraordinary fertility. It is to be hoped that other women of fortune will, in spreading civilization and religion over unknown and fertile regions of the globe, imitate the example of this intelligent lady, who will not only find her reward in the utility of her noble work, but will be remembered in this great river, which, to adopt a line from Scott, will

“Roll murmuring with her name forever.”

SUMATRA.

The Dutch Geographical Society of Amsterdam are maturing an expedition, to be supported by private subscriptions, for the exploration of Sumatra. It is to be directed to the Djambi territory, a part of Sumatra which is at present but little more than a blank upon the map.

FIJI ISLANDS.

The natives of the Fiji Islands have been greatly decimated by the measles brought to the islands by an English vessel of war. The

disease spread over the larger and smaller islands with frightful rapidity, and has carried off whole tribes. The population of the islands was recently estimated at 70,000 natives and 1,200 whites, and the material condition of the colony, now that the islands are conceded to the British government, is full of promise for the future.

CONCLUSION.

In conclusion, after this resumé of what has been done in a single year, I think we may feel the assurance that this work will go steadily on until, so far as it is in the power of man, every part of the earth's surface will be explored. The reasons for ascertaining what is unknown respecting the globe, are the same as they were in the time of Columbus. They are not now as then dependent upon the will of sovereigns, but upon an enlightened public opinion which stimulates individuals and acts upon nations; and, in my judgment, will continue to act until the parts of the earth which are now the domain of the savage, or shut off by the ignorance, the fanaticism or the policy of rulers, will be opened up to commerce, civilization and religion.